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Customer service
From 8:00 to 17:00 hrs.

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Company presentation

Crison began trading in Barcelona towards the end of 1970. Its original aim was to manufacture quality pH-measuring equipment in Spain at a more competitive price than the equipment being imported.

The choice of the best pH sensors for our pH-meters was, from the very beginning, the path to success for the company which has seen the number of instruments manufactured, its workforce and the size of its installations all grow at the same time.

In 1979, CRISON became a public limited company and underwent an intense phase of expansion with exports to over forty countries. In 1980, CRISON's products included pH-meters for laboratories and processes, conductivity meters and thermometers. Titrator production then began.

Due to its growth, in 1985 CRISON moved to its current facility in Alella, which in turn helped extend the R&D department, which was dedicated exclusively to incorporating microprocessor technology throughout the entire range of instruments. It is worthwhile pointing out the interactive software developed by our engineers, which is still regarded by users of CRISON equipment as one of its most valuable features.

The current growth of our market stems from the above boost given to the R&D department, the growth of our workforce, which currently employs 45 professionals, and the expansion of our installations. There is now a new building which is entirely dedicated to customer and distributor service.

Today, CRISON's installations cover 1700 m², these house all the company departments: R&D, production, warehouse, after-sales service, applications laboratory, calibration laboratory, marketing and the sales department. The company also benefits from a reserved area for use as a classroom and training lab.



Technology

CRISON's most notable achievements include the creation of a range of instruments manufactured



using SMD (Surface Mounted Device) technology, which has enabled us to substantially increase our production capacity and improve quality while maintaining competitive prices.

As regards electromagnetic compatibility, "EMC", we have our own fully-equipped laboratory and highly qualified per-

sonnel who can carry out all EC-required tests from the very beginning of any projects. All our equipment exceeds the minimum requirements established as regards immunity and electromagnetic radiation emissions, and is also highly resistant to the temporary electricity overloads caused by lightning flashes.



Quality

CRISON is an ISO 9001/2000 certified company.

This is a cause for satisfaction confirmed day in, day out on seeing how we have managed to instill the spirit of these standards in each and every member of our workforce.

Specialization and the quality of individual and teamwork are what lie behind CRISON's 35 years in business... and its future.

The advantages of CRISON and the services we offer

NEW!

Instruments with a 5-year warranty

Sensors with a 6-month warranty

The equipment and accessories manufactured by CRISON are guaranteed against manufacturing defects.

The conditions of the guarantee are included in the manual supplied with each item of equipment.

Clear user manuals

Each instrument or sensor is supplied with a well-edited and fully comprehensible user manual.

Immediate or early shipments

More than 80% of the articles in this catalogue are kept permanently in stock.

90% of all orders are dispatched within 24 hours of the order being placed.

Customers are informed accordingly if delivery is set to take over 48 hours.

Quick, economical and safe dispatch

Urgent transport is used for all our dispatches.

Carriage is free for all orders over 150 euros (within Spain, the Balearic Isles and Portugal).

Carriage: 5 euros for all orders under 150 euros.

Insurance is provided, at no additional charge, to cover 100% of the value of all dispatches.

Pre-sales Technical Support

A team of specialised professionals with years of experience in our sector can advise on the best choice of equipment to suit your needs.

Fast, economical and sometimes free after-sales service

The main aim of our after-sales service is to achieve customer loyalty by providing efficient service at the most competitive price possible.

Calibration Service

We have a calibration laboratory to calibrate equipment from our specialist area. Calibration certificates are issued according to ISO standards.

Training classroom and lab

CRISON provides courses on pH measuring, conductivity and dissolved oxygen, titration, etc. ...

These courses are taught by a team of experts. They are extremely practical and designed for small groups. The participants of each course are issued with a Certificate of Attendance.



Reception



Training classroom



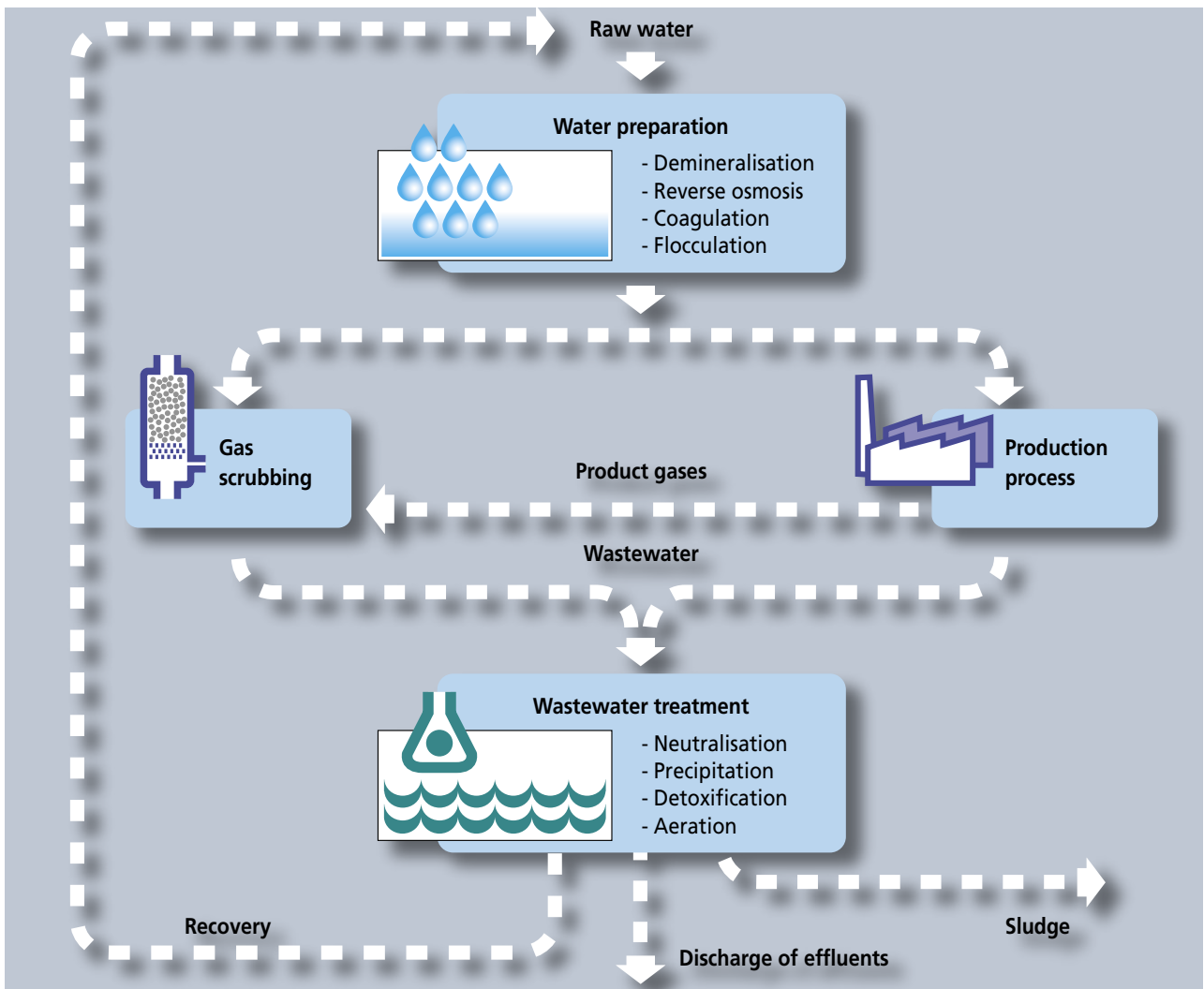
Laboratory

Introduction

This catalogue presents CRISON's specific range of products for measuring pH, conductivity and dissolved oxygen in water. The water cycle diagram highlights at which points it is important to measure, monitor and regulate these parameters.

Our equipment is mainly used in the various stages of treating incoming and wastewater and are being used more and more frequently in production processes.

Water cycle diagram





pH / mV - meters



Continuous measurement of pH and oxidation-reduction potential (ORP)

pH monitoring

pH is frequently measured when analysing water, both clean and waste and industrial waters. pH is a very important parameter in several stages of the water cycle. For example, in a reverse-osmosis process, the pH is directly related to the duration of the membranes. Another example is the process of biologically purifying lavatory water, where a very high or very low pH value can affect purification capacity. Current legal stipulations only allow wastewater with a pH value of between 6.5 and 8.5 to be added to the public sewage system. In some cases, e.g. in the brewing and dairy product industries, wastewater must previously be treated in a neutralisation plant. In other kinds of industry, such as galvanising and steelworks, certain elements in the water must be detoxified or even precipitated before pouring them away. The pH value needs to be measured, monitored and regulated continuously in all these stages. CRISON has been selling systems for measuring and monitoring pH for more than 25 years. Its products are famous for their easy handling, precision and reliability.

Examples of applications... by industry:

Brewery	Control of incoming / wastewater and cleaning processes.
Galvanising	Electrolytic baths and wastewater.
Chemical industry	Condensed products and wastewater.
Tannery	Soaking, bleaching and dyeing of leather.
Power stations	Steam circuit protection.
Water treatment plants	Wastewater treatment.
Food industry	Packaging in brine, etc..

Examples of applications... by process:

Reverse osmosis	Prevention of damage to membranes.
Demineralisation	Monitoring leaks in exchange columns.
Cooling water	Preventive work in facilities.
Boiler waters	Preventive work in facilities.
Wash water	Economy.
Wastewater	Environmental protection.
Natural water	Environmental protection.

ORP monitoring ,

(Oxidation-Reduction Potential, Redox)

Oxidation-reduction potential, ORP, also known as redox potential, indicates the oxidising or reducing properties of a substance.

Measuring ORP is important in decontamination processes, to eliminate, e.g. cyanide, chromates and nitrites.

To measure ORP, combined metallic electrodes with a Platinum or Gold ring are used.

Platinum is recommended for highly-oxidising solutions containing chlorides, natural waters and others. The electrode with a gold ring is recommended for highly-acidic solutions and for the treatment of wastewater containing cyanide and chrome.

Examples of applications... by process:

Detoxification in wastewater treatment.
Galvanising baths.
Bleaching baths.
Measurement in relevant materials.
Regulating dye baths.
Monitoring disinfection levels in swimming pools.
Nitrification/denitrification processes.

CRISON pH/mV transmitters

General overview



FEATURES

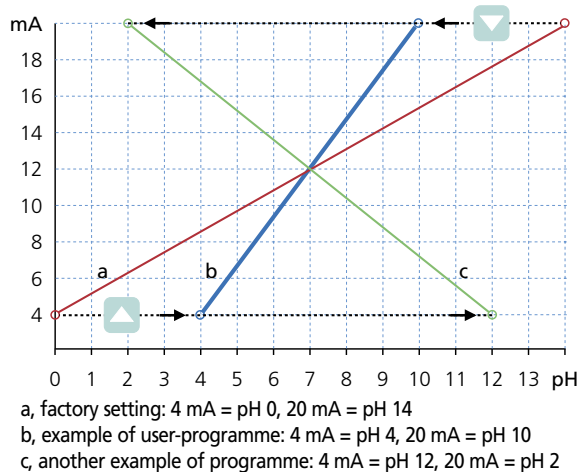
Model
Panel versions
Field versions
Backlit alphanumeric display
4...20 mA output
Regulation relays
On/off regulation
Proportional regulation
Cleaning and alarm relay
Installation test function: relays and 4...20 mA
Data logger
Indirect calibration to any value

TRANSMITTERS

PH 27	PH 28	PH 29
•	•	•
	•	•
•	•	•
•	•	•
	•	•
	•	•
		•
		•
		•
		•

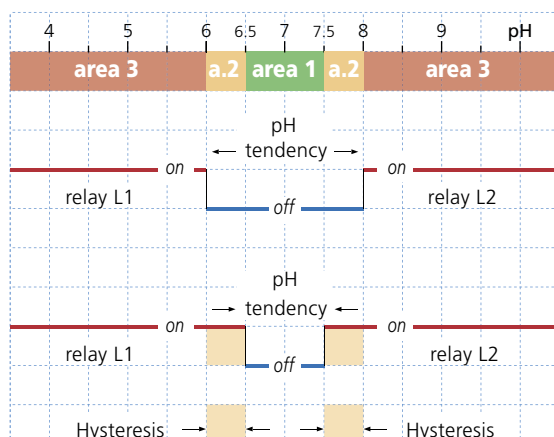
PH 27, PH 28 and PH 29.

4...20 mA output, depending on the pH



PH 28 and PH 29

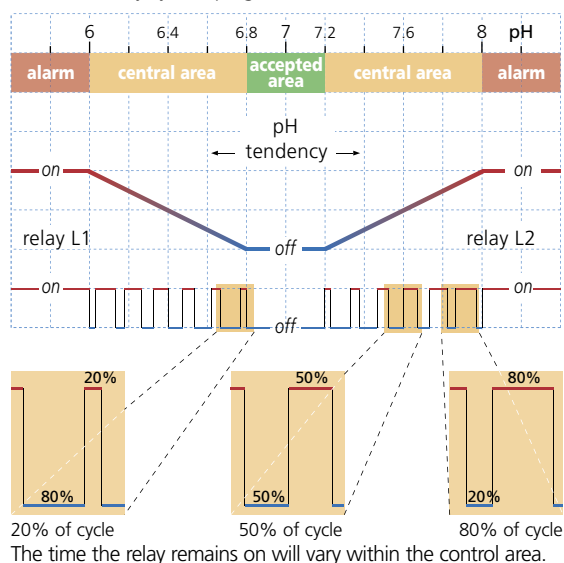
Relays activation in "On/Off" regulation mode



PH 29

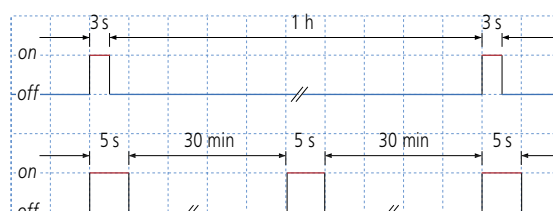
Relays activation in "proportional" regulation mode

The relays are activated proportionally, depending on the distance between the accepted and measured values. The on/off relay cycle is programmable between 2 and 99 s.



Sensor cleaning

The cleaning relay activates as programmed. The PH 29 is factory programmed to wash 3 s per hour. These values may vary, see sample graphs.





Field and panel pH-meters

These are specific instruments for measuring and, in some cases, controlling pH and mV in continuous processes.

There are different versions depending on the requirements for application and location.

The following versions are available:

- field and panel,
- with different voltages, 230, 115 or 24V A/C
- transmitters or controllers
- different regulation modes: *on/off* or proportional
- etc.

Main features

pH and temperature values are displayed simultaneously.

The display is backlit, which aids reading in dark places.

During calibration, the instruments automatically recognize buffers and have built-in criteria for accepting/rejecting the electrode.

The instruments are compatible with most glass-membrane pH electrodes on the market.

These instruments are very easy to handle.

They enable interactive dialogue in the user's own language (Spanish, English, French and Italian).

The display always provides the user with instructions for operation or help messages.

An access code prevents unauthorised personnel from interrupting measurement processes. Only authorised personnel can calibrate or program the equipment.

During calibration and programming, the instrument remains on hold.

The field versions have a water-tight transparent cover to protect the keypad and display.

The panel versions are especially prepared for mounting on standardised panels.

PH27 P

Active pH/mV transmitter (4-wire)
Analogue signal from 4...20 mA, user-programmable, to be built into automated processes. See fig. on page 9.

Only available in panel version, 96x96.

PH 28

pH/mV Controller.

Available in field and panel versions.

Apart from an analogue 4...20 mA output, it has two relays, both of which can be programmed to act either as maximum or minimum. Performs *on/off* regulation.

PH 29

pH/mV controller.

Available in field and panel versions.

The features which distinguish it from the PH 27 and the PH 28 are:

- 3 relays: 1 for limit, 1 for alarm and the third can be used as a limit or electrode cleaning.
- Proportional regulation, as well as *on/off*.
- As well as classic calibration with buffers, it allows the user to perform indirect calibration.
- *Data logger*. Stores up to 200 measurements. The data can be memorised with a scheduled frequency or, for example, when measurements are outside limits.
- Possibility of verifying installation; relays activation and 4...20 mA output.

Certificates

All models are supplied with the EC Declaration of Conformity as per EMC directives 73/23/EC on low-voltage devices and 89/336/EC, and with specifications certificate.

For further information on Certificates, refer to pages 79-80.



PH 28

PH 29

PH 27 P

PH 28 P

PH 29 P

Display examples

PH 27, PH 28 and PH 29

During start-up

...select language

IDIOMA >Español
Italiano

Français
English

...select unit of measurement ...

MEASUREMENT OF: >pH
mV

...and the instrument will automatically...

MEASURING
pH 7.37 25.2°C

For pH calibration

...enter the access code

CODE 000

...and follow the instructions

Insert 1st buffer
pH 7 25°C

Insert 2nd buffer

CALIBRATION OK

N.B.: See page 38 to
configure a complete
system.

Keypad

The whole range of functions can be accessed using only four keys and the "intelligent" display, without having to consult the user manual.



PH 28

When regulating a process

... "out of limit" measurement message (L1 or L2).

MEASURING >L2<
pH 12.34 38.5°C

PH 29

Indirect calibration.

MEASURING
pH 7.15 25°C

ENT (2s)

READJUSTING pH
pH 7.15 25°C



READJUSTING pH
pH 7.22 25°C

During regulation

... "alarm" warning.

>ALARM<
pH 10.00 23.5°C

...sensor "cleaning" warning.

WASHING
3s

Data logger

... storing data

MEASURING >DL<
pH 12.34 38.5°C

...checking data

001 12-11 15:00
pH 9.15 25.4°C

002 12-11 17:00
pH 9.18 25.6°C

Code	Description
27 02	PH 27 P panel pH-meter, 230 V
27 03	PH 27 P panel pH-meter, 24 V
28 00	PH 28 field pH-meter, 230 V
28 01	PH 28 field pH-meter, 24 V
28 02	PH 28 P panel pH-meter, 230 V
28 03	PH 28 P panel pH-meter, 24 V
29 00	PH 29 field pH-meter, 230 V
29 01	PH 29 field pH-meter, 24 V
29 02	PH 29 P panel pH-meter, 230 V
29 03	PH 29 P panel pH-meter, 24 V



pH-meters...

Technical specifications. Comparison table

Model		PH 27 P	PH 28 P	PH 29 P
Measuring range	pH -2.00...16.00	•	•	•
	mV -1500..1500	•	•	•
	°C -20.0...150.0	•	•	•
Measurement error (± 1 digit)	≤ 0.01 pH	•	•	•
	≤ 1 mV	•	•	•
	≤ 0.3°C	•	•	•
Reproducibility (± 1 digit)	± 0.01 pH	•	•	•
	± 1 mV	•	•	•
	± 0.1°C	•	•	•
Automatic temperature compensation	With Pt 100 probe			•
	With Pt 1000 probe	•	•	•
	Entering data via keypad	•	•	•
pH calibration options	2 points between 3 values		•	
	1, 2 or 3 points between 5 values	•		•
	Indirect calibration at any value between 0-14 pH			•
Buffer recognition Technical values at 25°C	4.01, 7.00, 9.21		•	
	2.00, 4.01, 7.00, 9.21, 10.90	•		•
pH electrodes acceptance criteria	Slope 85...103%	•	•	•
	Assymetry potential < 60 mV	•	•	•
Analogue output, programmable galvanically insulated (R max. = 500Ω)	4...20 mA for measurements. Max. expansion 1 pH or 100 mV	•	•	•
	21 mA or last value for instrument on hold	•	•	•
	22 mA as alarm signal		•	•
Control modes	On/Off		•	•
	Proportional			•
Relays, delayed activation potential-free, Maximum load A/C < 250 V, < 3 A, < 750 VA	2 limit relays. N/O Contacts		•	
	1 for limit. N/O Contact			•
	1 for limit or cleaning. N/O Contact (switch-over)			•
	1 for alarm. N/C Contact			•
Verify installation	relays activation			•
	Output 4-20 mA			•
Data logger	Memory capacity 200 data entries			•
Languages	English, Spanish, French and Italian	•	•	•
Display	LCD, alphanumeric, backlit	•	•	•
	2 lines of 16 characters	•	•	•
Length of electrode cable	Recommended ≤ 25 m. Max 50 m	•	•	•
Power supply	230 or 24 V A/C ± 10 %, 45-65 Hz (115 V A/C special order)	•	•	•
	Consumption 4 VA	•	•	•
	Protection: Class II. Surge category: II	•	•	•
Electrical safety	As per EN 61010-1 Norm	•	•	•
E.M.C. (electromagnetic compatibility)	As per EN 50081-1, EN 0051-2 , EN 50082-1, EN 0052-2	•	•	•
Ambient conditions	Operating temperature: -20...55°C.	•	•	•
	Storage: -20...70°C	•	•	•
	Relative humidity, not condensed, < 80%	•	•	•
	Maximum altitude: 2000 m at 230 V, 3000 m at 24 V	•	•	•
Enclosure	Field versions:			
	Thermoplastic material, IP 55 protection		•	•
	Panel versions:			
Physical parameters	PPE, ether polyphenylene, IP 54 Protection	•	•	•
	Field versions:			
Physical parameters	Weight 700 g. Size 105x170x100 mm.		•	•
	Panel versions:			
Physical parameters	Weight 600 g. Size 96x96x100 mm.	•	•	•

Specifications subject to change without notice.

Diagram of a pH or redox potential measuring system using the PH 27 P



Model to choose...

... if the user only wants to monitor a process.

... when direct regulation is not required (relays).

... if the pH-meter is to be integrated into an external regulation system.

The PH 27 is only available in the panel version.

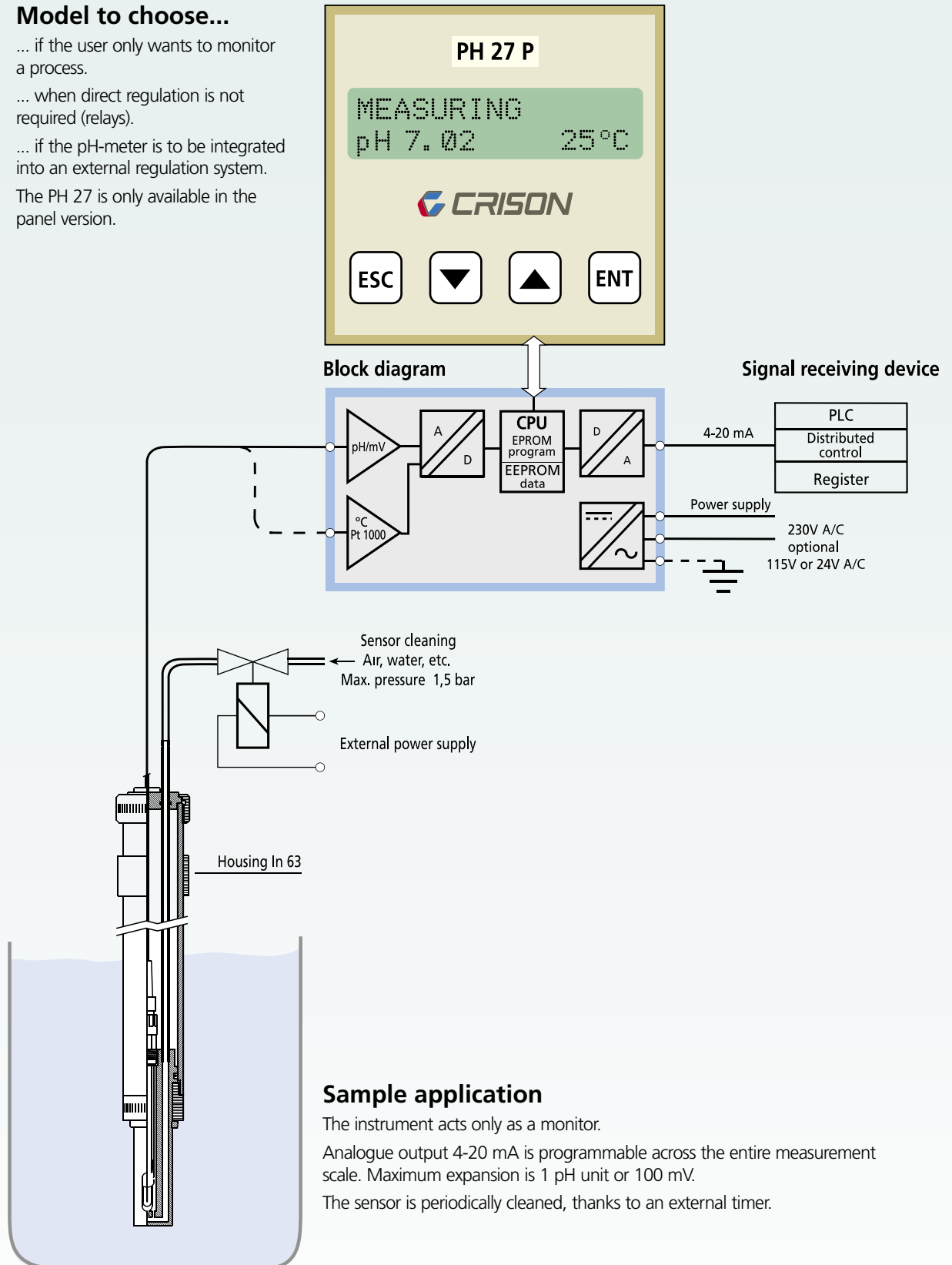




Diagram of a pH or redox potential measuring system using the PH 28 or 28 P

Model to choose...

... if a watertight field instrument is required.

... when the user wishes to use the instrument as an on/off controller utilising the device's own relays.

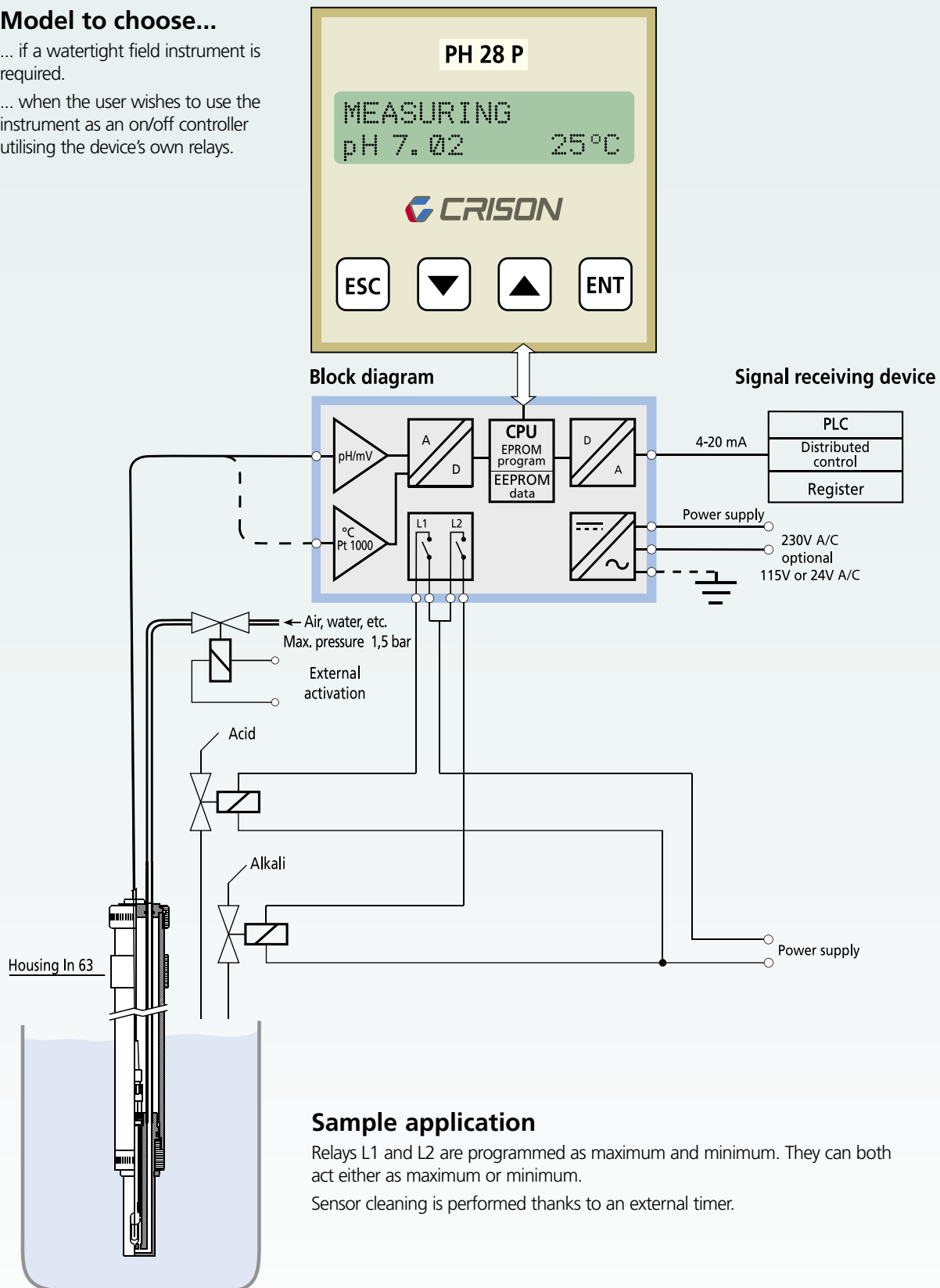


Diagram of a pH or redox potential measuring system using the PH 29 or 29 P



Model to choose...

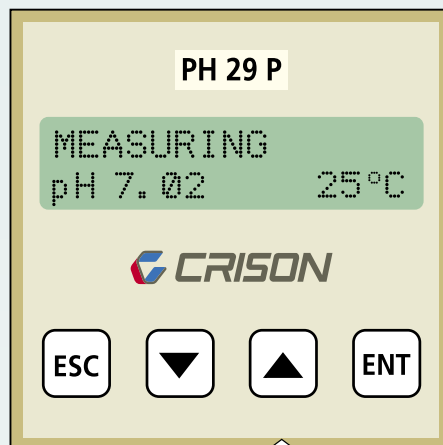
... when proportional regulation is absolutely necessary.

... to avoid the use of an external regulation system.

... when an alarm relay is necessary.

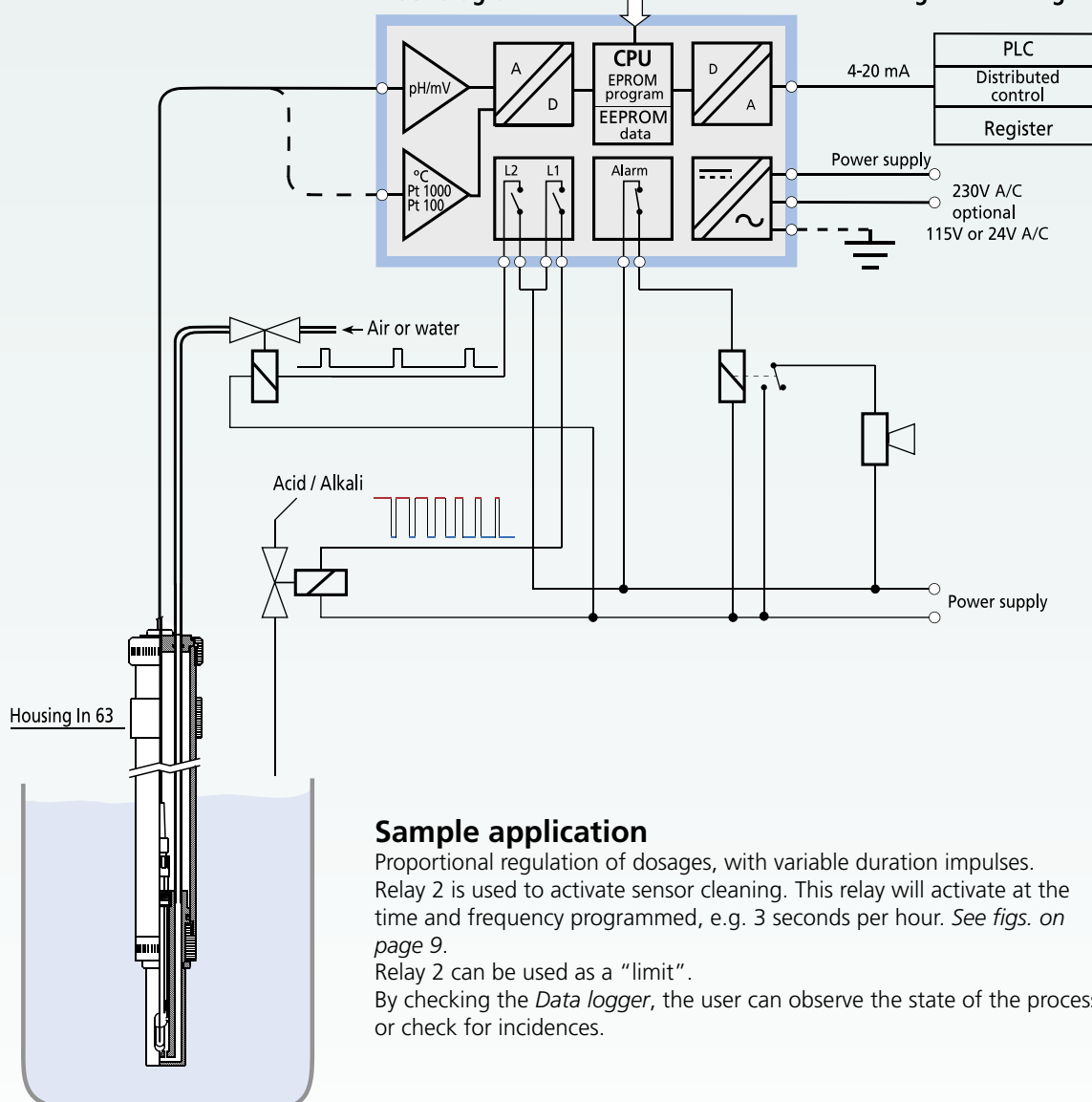
... if the user wishes to clean the sensor without using an external timer.

... To be able to check, using the *Data logger*, what happened during the process and comply according to the GMP (Good Manufacturing Practice).



Block diagram

Signal receiving device



Sample application

Proportional regulation of dosages, with variable duration impulses.

Relay 2 is used to activate sensor cleaning. This relay will activate at the time and frequency programmed, e.g. 3 seconds per hour. See *figs. on page 9*.

Relay 2 can be used as a "limit".

By checking the *Data logger*, the user can observe the state of the process or check for incidences.

pH/mV simulator, SI 75

The perfect tool for verifying lab and process pH-meters and complete installations for pH monitoring and regulation. Helps clear up any doubts. The instrument emits similar signals to those of a pH electrode, both at high and low impedance. Allows "in situ" electronic pH-meter calibration.

Key features

The pH or mV simulated value appears on the **liquid crystal display**.

Highly stable in the event of temperature variations, see specifications.

"Long life" membrane keypad, guaranteed for up to 6 million strokes per key.

IP 65 Protection against dust and water.

Simulates 7 pH and 7 mV values.

The output signals can be selected at **high or low impedance**.

Comes complete with an S7/S8 connector, thus allowing the electrode cable to be connected directly.

The instrument **switches off automatically** if no keys are pressed for 5 minutes. This function can be disabled by the user.

Uses very little electricity. With the instrument on, the batteries will last approximately 180 hours.

Low battery level indicator.

Practical carry-case, optional, for protection and transport of the instrument.

Operation

The SI 75 software is similar to that of all other CRISON portables, and has been designed to make this new range of instruments as user friendly as possible.

Certificates

The SI 75, codes 75 00 and 75 01, is supplied with the **Specifications Certificate** and the EC Declaration of Conformity as per directive EMC 89/336/EC.

Instruments with code 7504 are supplied with an **ISO Calibration Certificate**, issued by the CRISON calibration lab.

For further information, please see page 79.

Re-calibration

The SI 75 is an instrument with low levels of drift over time, thanks to the high quality of the components used in production, and especially to the high level of stability and precision of its reference voltage.

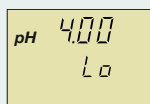
However, to ensure that the simulated values are exact CRISON recommends annual re-calibration.



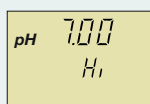
The SI 75 is connected directly to the electrode cable

Display examples

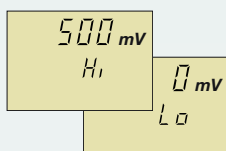
Low-impedance pH simulation



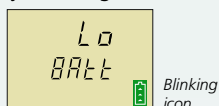
High-impedance pH simulation



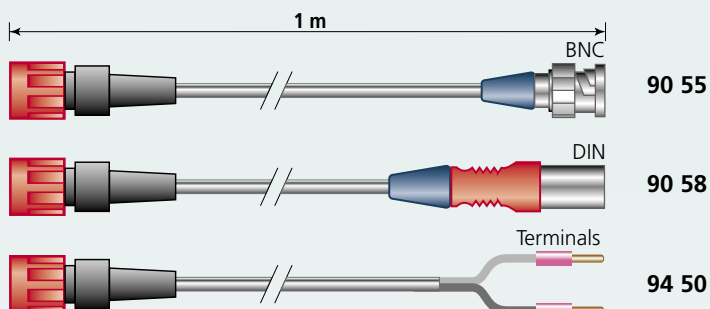
Low and high-impedance mV simulation



Low battery warning



Cables for connecting the SI 75 to different pH-meters.



Code	Description
75 00	SI 75 Simulator
75 01	SI 75 Simulator with carry-case
75 04	SI 75 Simulator, with carry-case and calibration certificate
90 55	Cable for connecting the SI 75 to pH-meters with BNC connector
90 58	Cable for connecting the SI 75 to pH-meters with DIN connector
94 50	Cable for connecting the SI 75 to pH-meters with terminal strips

Specifications

Simulated values	pH 0, 2, 4, 7, 10, 12, 14 (values at 25°C) mV -1000, -500, -250, 0, 250, 500 and 1000
Output signal	Low impedance < 100 Ohm (Ω). High impedance 500 MOhm (MΩ).
Resolution	0.01 pH, 1 mV
Error (±1 digit)	≤ 0.01 pH, ≤ 1 mV
Reproducibility (±1 digit)	0.01 pH, 1 mV
Thermal drift	Full range 30 ppm / °C Offset 15 µV / °C
Signal output connector	With thread for AS 9 connector.
Automatic switch-off	After 5 minutes. Option to disable this function.
Display	Liquid crystal with icons
Keypad	Membrane, 4 keys. Up to 6 million strokes per key guaranteed. Material: PET with protective treatment
Power supply	2 x 1.5V AA batteries, autonomy > 180 h.
Electrical safety	UNE-EN 61010-1, UNE-EN 61010-1/A 2
E.M.C. (ElectroMagnetic Compatibility)	In accordance with EC, UNE- EN 61326, UNE-EN 61326/A 1, UNE-EN 50082-2
Degree of protection	IP 65
Ambient conditions	Operating temperature: -10...40°C. Storage and transport temperature: -15... 65°C Relative humidity, not condensed, < 80%
Enclosure	Casing material ABS
Physical parameters	Weight 200 g, size 160 x 75 x 50 mm.

Specifications subject to change without notice



Electrodes

pH and redox (ORP) electrodes.

A little theory

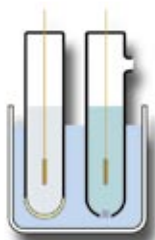


Introduction

The pH measurement of a solution is based on transforming the electrical signal obtained using a glass electrode (indicator) and a reference electrode.

According to Nernst's law, this signal is proportional to H^+ ion activity.

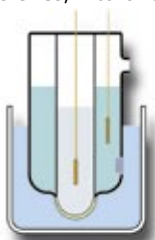
The potential of the glass electrode is directly dependent on the pH of the sample, whereas the reference electrode has a constant potential which is compared to that of the indicator electrode.



TWO ELECTRODES
GLASS + REFERENCE

Evolution

In 1948, Dr. Ingold made the first combined electrode. He merged the two electrodes, indicator and reference, into one.



A COMBINED
ELECTRODE

Ever since they were invented, pH electrodes have evolved to adapt to the most diverse measuring conditions.

Electrodes today...

Manufacturers are currently attempting to improve and optimise the essential parts of the electrode.

Connectors must be air and watertight, designed without internal cavities to avoid the effects of water condensation on the inside.

Apart from being pH-sensitive, membranes need to be resistant to aggressive chemical and physical substances. Excellent quality glass is available nowadays.

Maximum attention is focused on reference systems, especially, the "liquid joint" diaphragm. This is the weakness of all electrodes, both glass and the new ISFET.

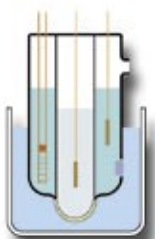
CRISON offers an improved electrode with internal diaphragm, open with a circular groove shape, made of porous Teflon.

CRISON provides a selection of sensors which combine all the best "ingredients" for every application. Not forgetting the economy factor.

Electrodes with temperature sensors

Recent years have witnessed the appearance of combined electrodes with a built-in temperature sensor.

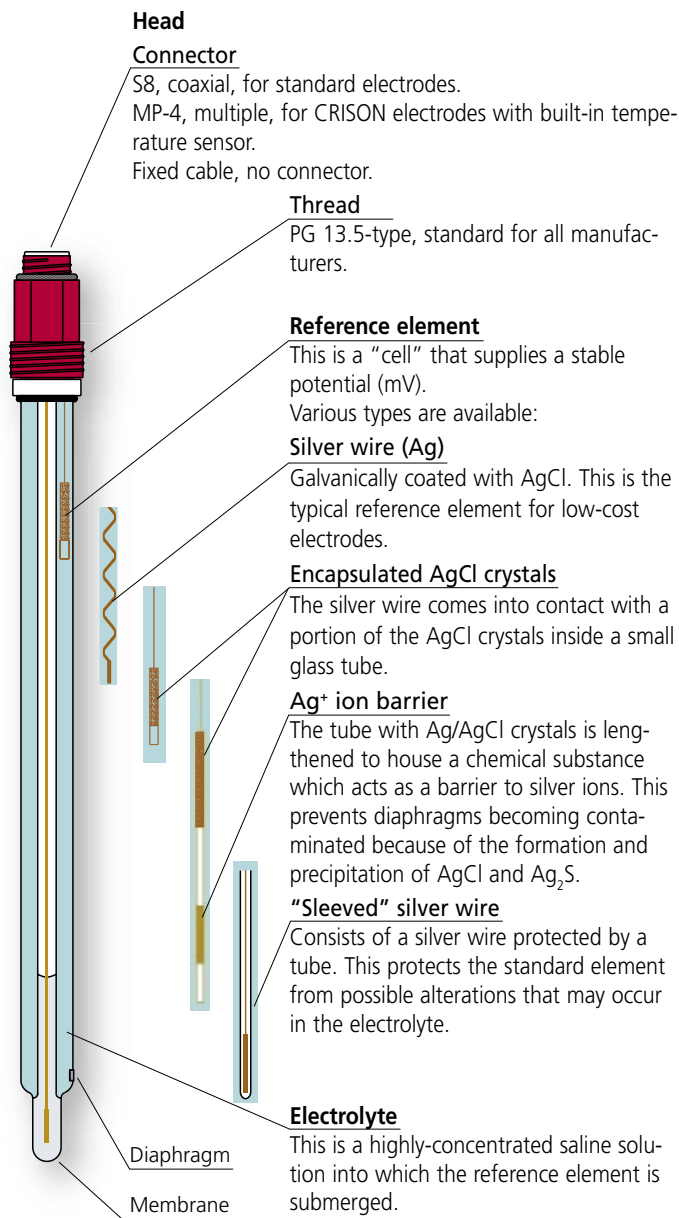
This allows us to measure pH and temperature simultaneously at the same point. This can be particularly important when calibrating with buffers. The downside of these electrodes is that they are more expensive to replace.



ELECTRODE
COMBINED WITH ATC

pH and redox (ORP) combined electrodes

Main components



Head

Connector

S8, coaxial, for standard electrodes.
MP-4, multiple, for CRISON electrodes with built-in temperature sensor.
Fixed cable, no connector.

Thread

PG 13.5-type, standard for all manufacturers.

Reference element

This is a "cell" that supplies a stable potential (mV).
Various types are available:

Silver wire (Ag)

Galvanically coated with AgCl. This is the typical reference element for low-cost electrodes.

Encapsulated AgCl crystals

The silver wire comes into contact with a portion of the AgCl crystals inside a small glass tube.

Ag⁺ ion barrier

The tube with Ag/AgCl crystals is lengthened to house a chemical substance which acts as a barrier to silver ions. This prevents diaphragms becoming contaminated because of the formation and precipitation of AgCl and Ag₂S.

"Sleeved" silver wire

Consists of a silver wire protected by a tube. This protects the standard element from possible alterations that may occur in the electrolyte.

Electrolyte

This is a highly-concentrated saline solution into which the reference element is submerged.

It comes in 3 forms: liquid, gel or solid (polymer), depending on the type of electrode.

Liquid electrolytes. Used for refillable electrodes.

There are various types for different applications. They are all KCl-based.

Gel electrolytes. These are used in non-refillable or "low maintenance" electrodes.

Most are glycerine gels.

Electrodes with wide PTFE diaphragm include a polyacrylic gel, thanks to which there is little electrolyte diffusion through the diaphragm.

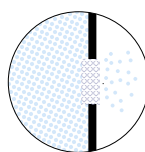
Solid electrolytes. These are also used in "non-refillable" electrodes. They are made of a conducting polymer.

Diaphragm

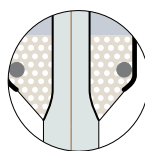
This is the point of union between the sample and the electrolyte. It is the critical part of the electrode as it has a direct influence on its lifespan.

A wide range of diaphragms are available. They vary according to manufacturer, application, quality of electrode and price.

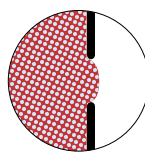
This catalogue features electrodes with ceramic, porous PTFE and open diaphragms.



The **ceramic diaphragm** is a chemically-inert, porous ceramic plate. These are the traditional diaphragms. They allow a small electrolyte flow towards the sample. The flow is greater if pressurised electrodes are used.



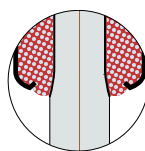
Porous PTFE, consisting of a large ring of porous PTFE through which contact between the electrolyte and the sample is made. The conductivity of the sample is hardly altered, thanks to the low level of flow provided by the polyacrylic electrolyte.



Open, which in fact should be called "without diaphragm". The sample and the electrolyte are in direct contact. There is no electrolyte flow. It is only used with electrodes with solid electrolyte (polymerised).

There are two types available:

- lateral orifice. This consists of an orifice in the body of the electrode.



- circular "ring-like" groove between the main body, the indicator electrode and the reference electrode.

Facilitates maximum contact with the sample.



The glass membrane

The composition of the glass membrane affects characteristics such as sensitivity, chemical, thermal and mechanical resistance of the electrode or the scale of measurement, e.g. a pH of 0...12, of 0...14. There are membranes with specific types of glass, e.g. to measure pH in the presence of a certain concentration of HF. There are also special membranes for measuring at extremely low temperatures (-30°C).

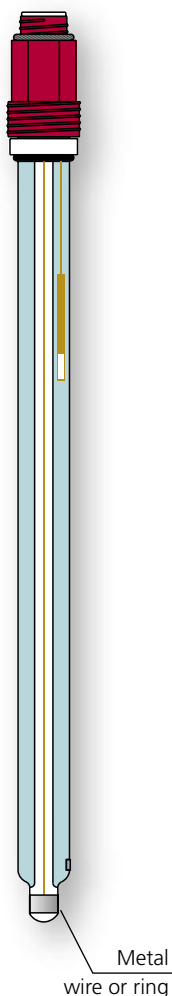
A large membrane is a symbol of quality.

The speed at which an electrode responds depends directly on the quality of its membrane.

Electrodes to measure ORP

(Oxidation-Reduction Potential, Redox)

These electrodes are also called "metallic" electrodes and are made of platinum or gold. They measure the oxidizing or reduction character of a solution. They have undergone the same changes as pH electrodes. As far as their connectors, reference elements, electrolyte and diaphragms are concerned, they come in the same forms, but the glass membrane is replaced with a ring or wire made from a noble metal, usually platinum. This catalogue does not feature redox electrodes with integrated temperature sensors because the measuring instrument does not perform temperature compensation (See Page 33).



Practical considerations

Price-quality ratio

In practice, the quality of the electrode used has a direct bearing on the reliability of a measurement. In continuous processes, the electrode is permanently subjected to severe conditions. It is, then, very important that they are resistant and durable. Quality must prevail over price.

CRISON only supplies top quality electrodes because experience has proven them to be a better investment in the medium and long-term.

Lifespan of an electrode

The average "life expectancy" of a process pH electrode is approximately 6 to 12 month, depending on the level of use and maintenance.

Electrodes installed in new housings, with automatic cleaning system, last longer and the measurements are more reliable. Electrodes exposed to high temperatures do not last as long.

Very alkaline mediums also reduce the lifespan of electrodes.

If the lifespan of your electrode is too short, ask us about it; you could be using the wrong electrode!

Common problems

Use of the wrong electrode, or mis-use of the electrode, causes a series of problems that will substantially reduce the lifespan of the electrode.

The most common problems, along with their causes and consequences, are:

- Unstable readings...
Diaphragm blockage. Open measuring circuit.
- Shifting of pH values.
Reference system contamination.
Slow response and wrong measurements.
Build-up of dirt on the membrane.
- Loss of sensitivity.
Due to ageing or erosion of the surface of the membrane.
Short-circuit in the connector.
- Non-linear response.
Membrane ageing or wear.
- Connector flooding.
Incorrect installation of the cable and/or housing.
Tears in the protective sleeve of the coaxial cable.

Guarantee

CRISON electrodes are guaranteed for a six-month period. The guarantee only covers manufacturing defects.

The guarantee does not cover defects that could arise from incorrect use, handling, application or maintenance, or as a result of premature wear inherent to certain samples.

This catalogue shows a range of electrodes which covers most of the main applications for water and the industry in general. If you cannot find the right kind of electrode for your application, please do not hesitate to contact CRISON.



pH and redox electrodes.

Key features

Code	Liquid electrolyte												Page
	Gel electrolyte												
	Polymer electrolyte												
	Protected reference system												
	Blockage-free diaphragm												
	HF Resistance												
	Resistance to high temperatures > 100°C												
	Can be steam-sterilised												
	Can be placed in autoclave												
	Integrated ATC												
Fixed-cable													
Low-cost													
53 30		•		•	•		•					27	
53 31		•		•			•					26	
53 33		•		•							•	25	
53 34		•		•	•		•		•			27	
53 35			•	•	•							30	
53 37			•	•	•				•			30	
53 38		•								•	•	28	
53 40		•								•	•	29	
53 41		•		•		•						25	
53 64			•	•	•		•	•	•			31	
53 65	•			•			•	•				24	
53 66	•			•			•	•				24	

Concepts

Electrolyte: liquid, gel or polymer.

See *essential parts of the electrode*, page 20.

Protected reference system.

Sleeved, with internal diaphragm, with silver ion barrier, etc. The purpose of these is to prevent contamination of the reference element by keeping the potential stable.

Blockage-free diaphragm.

Either due to the shape, large diaphragm, no diaphragm, open diaphragm, or the type of electrolyte.

HF resistance.

The resistance of the membrane depends on the concentration of HF and the pH of the sample.

Resistance to high temperatures.

Either continuous operating temperatures or occasional high temperatures, e.g. during sterilisation.

Can be steam-sterilised.

Resists "in situ" steam-sterilisation.

Autoclavable.

May be sterilised in autoclave.

Electrodes with integrated ATC.

This allows us to measure pH and temperature simultaneously at the same point. The main advantage is that it makes installation simpler. The two signals – pH and temperature – are transmitted to the instrument using a single probe and a single cable.

Fixed-cable electrodes.

These are justified when price is the deciding factor. They are cheaper because there are no head and cable connectors.

Low-cost electrodes.

Batch manufacturing, or the fact that they are simple electrodes for uncomplicated applications, makes them cheaper.

Redox electrodes

Their outstanding features are similar to those of pH electrodes. See corresponding models.

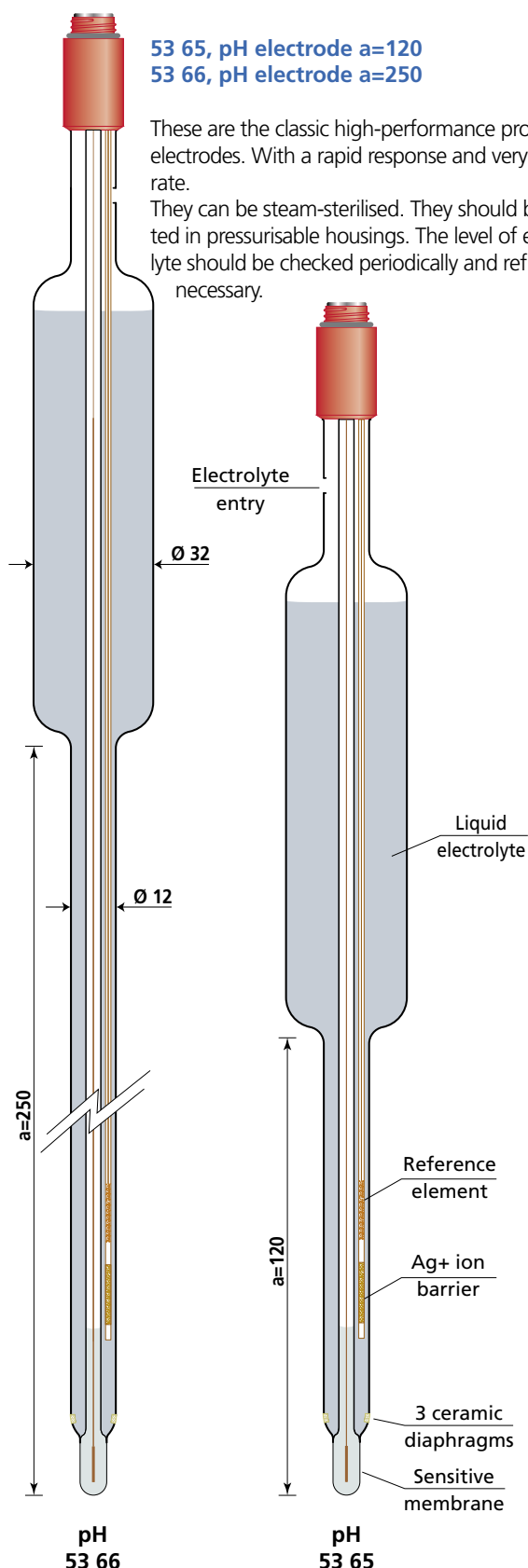
Applications for pH and redox electrodes



Application	pH	ORP	Observations
Water treatment			
Drinking water	53 33		
Boiler waters	53 33		
Cooling water	53 30		Low conductivity samples. Electrodes with a large contact surface area diaphragms are required.
Gas scrubbing towers	53 33 / 41		In some cases, these samples contain HF, so HF-resistant electrodes might be required.
Swimming pools	53 33 / 38 / 40	53 58 / 56	Normally, precision electrodes at competitive prices are required.
Wastewater treatment			
Industrial waters	53 30 / 31 / 35	53 50	These are very dirty samples, so a relatively clog-free diaphragm will be required for the electrode.
Galvanising industry	53 30 / 31		
Heavy-metal precipitation	53 30 / 35		
Detoxification	53 31 / 33	53 54	In very acidic media with chromium, CRISON recommends measuring ORP with gold electrodes.
Oily waters	53 35		An electrode with an open diaphragm guarantees correct measurement in this type of medium.
Tannery waters	53 35 / 64		CRISON recommends the use of a highly-resistant electrode.
Foodstuffs and beverages			
Water for beverages	53 31 / 33		
Dairy products	53 30 / 64		Periodic maintenance of these electrodes should be carried out using a protein-cleansing solution.
Wines	53 30 / 35	53 50 / 55	This electrode avoids problems of clogged diaphragms caused by the sample.
Beet sugar purification	53 64 / 65 / 66		These applications require highly-resistant electrodes, both for the medium to be measured and for the CIP and sterilisation processes.
Edible fats production	53 64 / 65 / 66		
CIP processes	53 64 / 65 / 66		Electrodes resistant to highly-alkaline media and high temperatures should be used.
Soft drinks	53 30		
Fish-farming	53 38 / 40		Normally, precision electrodes at competitive prices are required.
Pharmaceutical industry			
Fermentors	53 65 / 66		High-precision electrodes, resistant to steam-sterilisation and CIP processes should be used.
Biotechnology	53 65 / 66		
Chemical Industry			
Starch production	53 64 / 65 / 66		Electrodes resistant to high temperatures and adequate for viscous samples should be used.
Colourings	53 64		An electrode with a hard to contaminate diaphragm and reference system should be used.
Paper bleaching	53 64 / 65 / 66		
Petrochemical industry	53 64 / 65 / 66		
Products containing HF	53 41		The HF concentration and the pH of the sample should be controlled, see page 25.

“Long life” pH electrodes for difficult conditions

liquid electrolyte



53 65, pH electrode a=120

53 66, pH electrode a=250

These are the classic high-performance process electrodes. With a rapid response and very accurate.

They can be steam-sterilised. They should be mounted in pressurisable housings. The level of electrolyte should be checked periodically and refilled, if necessary.

Advantages

Their three ceramic diaphragms.

The silver-ion barrier.

Rapid, accurate response.

Sterilisable “in situ”.

These electrodes resist where others are “short-lived”.

Because they are pressurised externally, there is a greater contact between the electrolyte and the sample through the diaphragms, which also causes “self-cleaning”.

Disadvantages

The level of electrolyte needs to be checked periodically.

They should be mounted in pressurisable housings.

Applications, examples

Biotechnology.

Sugars, yeasts, starch.

Distilled waters.

Dyes and colourings.

Mounting

In pressurisable housings.

They are compatible with all pressurisable housings on the market.

Cables

Connected to coaxial cables with AS9 connector.

(See page 75)

Specifications

Electrode	53 65	53 66
Measuring range	0...14 pH	
Operating temperature	0...135 °C	
Max. operating pressure	up to 6 bar	
Reference system	Encapsulated Ag/AgCl + Ag ⁺ ion barrier	
Electrolyte	CRISOLYT V	
Contact diaphragms	Ceramic, 3	
Connector, protection	S7, IP65	
Body material	Glass	
Shaft length (a)	120 mm	250 mm

pH and redox electrodes for "clean" waters

gel electrolyte

pH
mV

53 33, pH electrode
53 41, pH electrode, HF resistant
53 53, ORP (Redox) electrode, platinum
53 54, ORP (Redox) electrode, gold

These are low-maintenance electrodes which do not require electrolyte levels to be monitored or refilled.

Advantages

These instruments are robust and easy to handle. They can be mounted in a large number of housings. Internal diaphragm which protects the reference element from contamination.

Low maintenance, do not require electrolyte refilling. Automatic compensation of pressure in the medium: no special housings required. Very competitively priced

Limitations

Samples with very low conductivity. Viscous or "dirty" samples which quickly clog the diaphragm. High temperatures.

Applications, examples

Swimming pools, drinking water, Gas scrubbing towers, Deodorising towers, etc.

Waters with fluoride

There is one version, code 53 41, which measures pH in waters containing fluoride. The chemical resistance of the membrane depends on the pH and the concentration of HF.

pH @ 20 °C	Limit of concentration F ⁻ (ppm)
2	300
3	1000
4	6000
≥5	no limit

Mounting. See housings, pages 66...73

In immersion housings In 61, In 63 and In 68.

In insertion housings In 76, In 77 and In 78.

In flotation housings FL 60 and FL 69.

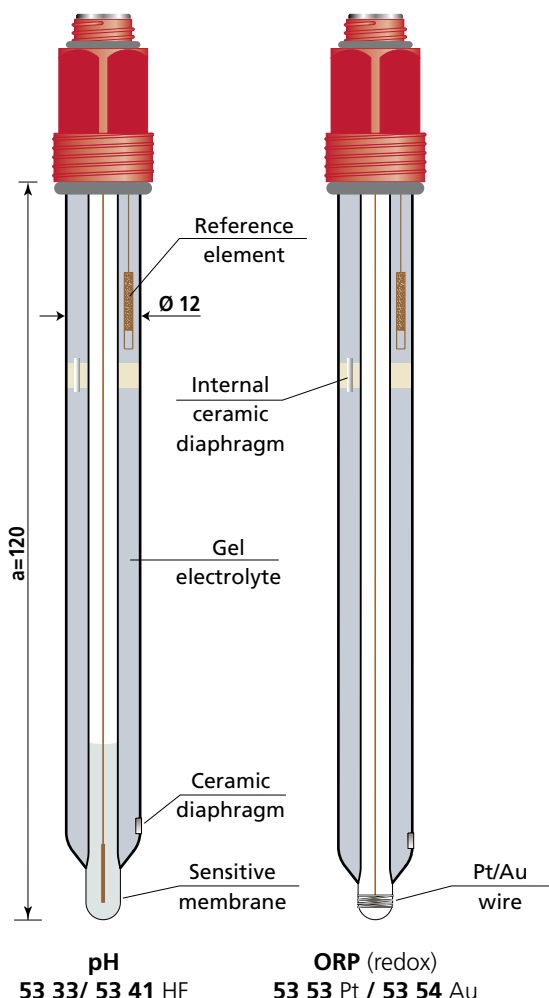
In flow-through chamber CR 60.

Cables

Connected to coaxial cables with AS9 connector. (See page 75)

Specifications

Electrode	53 33	53 41	53 53	53 54
Measuring range	0 ... 14 pH		±2000 mV	
HF resistance	--	✓	--	--
Indicator metal	--		Pt	Au
Operating temperature	0...80 °C			
Max. operating pressure	Up to 6 bar			
Reference system	Encapsulated Ag/AgCl crystals			
Electrolyte	Gel			
Contact diaphragm	Ceramic			
Thread	PG 13,5			
Connector, protection	S8, IP65			
Body material	Glass			



pH and redox (ORP) pressurised electrodes

gel electrolyte

53 31, pH electrode

53 51, ORP (Redox) electrode, platinum

Electrodes with pressurised electrolyte are high-performance items.

They have a special reference system, the main feature of which is that the gel electrolyte has been pressurised in the factory at 2.5 bar. This pressure means that there is a constant flow of electrolyte out from the electrode, which cleans the diaphragm continuously.

Another feature of these electrodes is that there is no silver in the electrolyte and they have a reference element with a "barrier against silver ions". This prevents Ag^+ ion migration towards the diaphragm, thus avoiding contamination through the formation and precipitation of AgCl and Ag_2S .

Advantages

Diaphragm self-cleans, thanks to pressurisation.
Auto-compensation for medium pressure: no special housings required.

Resistant to high temperatures.

Low maintenance, no electrolyte refilling required.

Disadvantages

The slow but progressive loss of internal pressure which begins once the diaphragm is unsealed.

The pressurisation lasts on average 1 year, but this will always depend on the application in question.

Mounting. See housings, pages 66...73

In immersion housings In 61, In 63 and In 68.

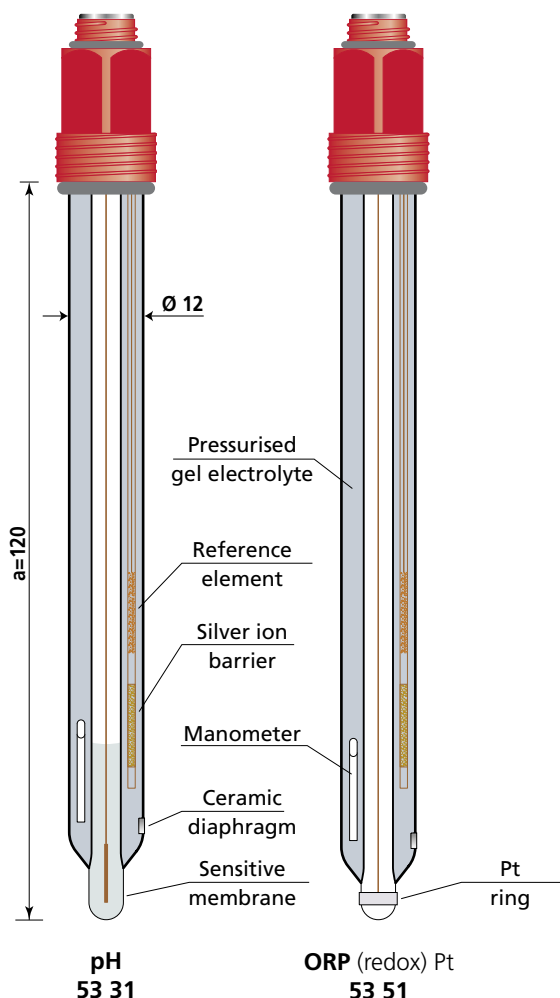
In insertion housings In 76, In 77 and In 78.

In flotation housings FL 60 and FL 69.

In flow-through chamber CR 60.

Cables

Connected to coaxial cables with AS9 connector.
(See page 75)



Specifications

Electrode	53 31	53 51
Measuring range	0 ... 14 pH	±2000 mV
Indicator metal	--	Pt
Operating temperature	0...100 °C	
Max. operating pressure	Up to 2.5 bar	
Reference system	Encapsulated Ag/AgCl + Ag^+ ion barrier	
Electrolyte	Gel	
Contact diaphragm	Ceramic	
Thread	PG 13,5	
Connector, protection	S8, IP65	
Body material	Glass	

pH and redox (ORP) electrodes with large diaphragm (porous PTFE)

gel electrolyte

pH
mV

pH Electrode 53 30.

53 34, pH electrode with integrated Pt1000.

53 50, redox (ORP) electrode, platinum.

Its main feature is its large diaphragm, made of porous Teflon, facilitating contact between the electrolyte and the sample.

The sleeved reference element is highly resistant to contamination by external ions.

This is the electrode recommended when the lifespan of others is lower than expected.

It is also a gel electrolyte electrode, i.e. low-maintenance.

Resistant to temperatures up to 100°C.

Advantages

This range of electrodes has all the advantages of a large, PTFE diaphragm:

- Good contact with the sample
 - repels dirt
 - does not clog easily
 - very little contamination of de-mineralised waters
- Model 53 34, with integrated ATC Pt1000 also allows simultaneous measurement of pH and temperature at the same point. Makes calibration easier.

Disadvantages

The price: these electrodes are hard to manufacture. Model 53 34: replacement of this electrode, with its integrated temperature sensor, is slightly more expensive.

Applications, examples

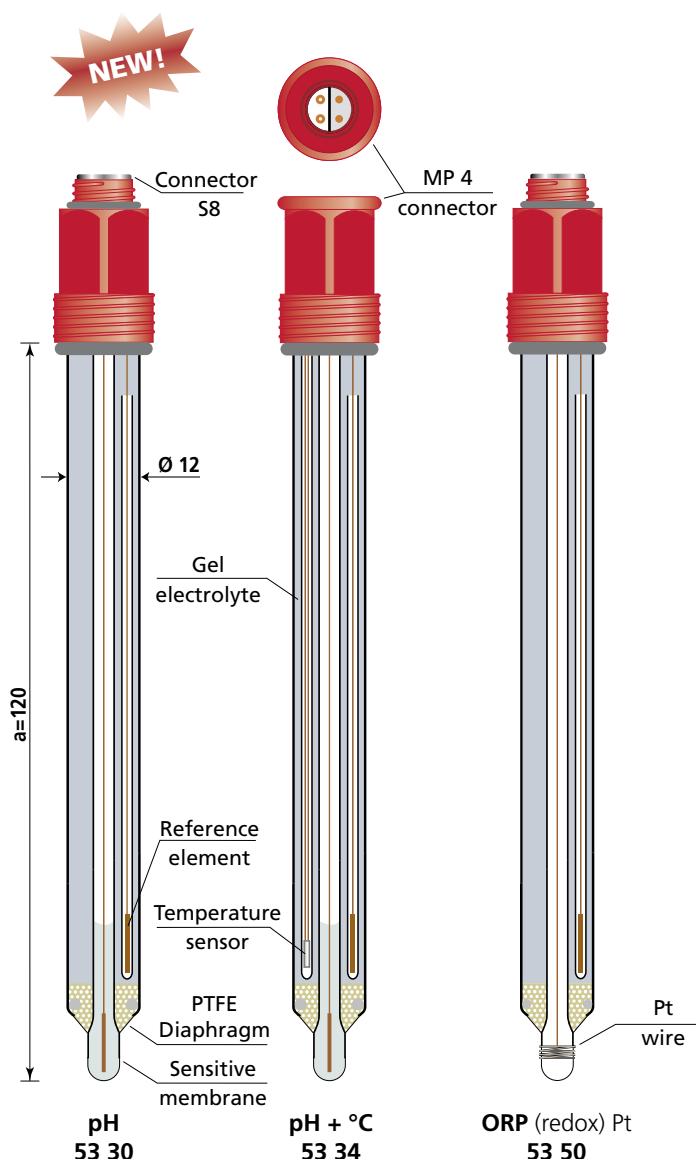
Wastewater.
Galvanising baths.
Osmosis processes.
De-mineralised waters.
Dirty and viscous samples, etc.

Mounting. See housings, pages 66...73

In immersion housings In 61, In 63 and In 68.
In insertion housings In 76, In 77 and In 78.
In flotation housings FL 60 and FL 69.
In flow-through chamber CR 60.

Cables

The electrodes with S8 connectors are attached to coaxial cables with an AS9 connector.
53 34 uses cables with MP-4 connector.
(See page 75)



Specifications

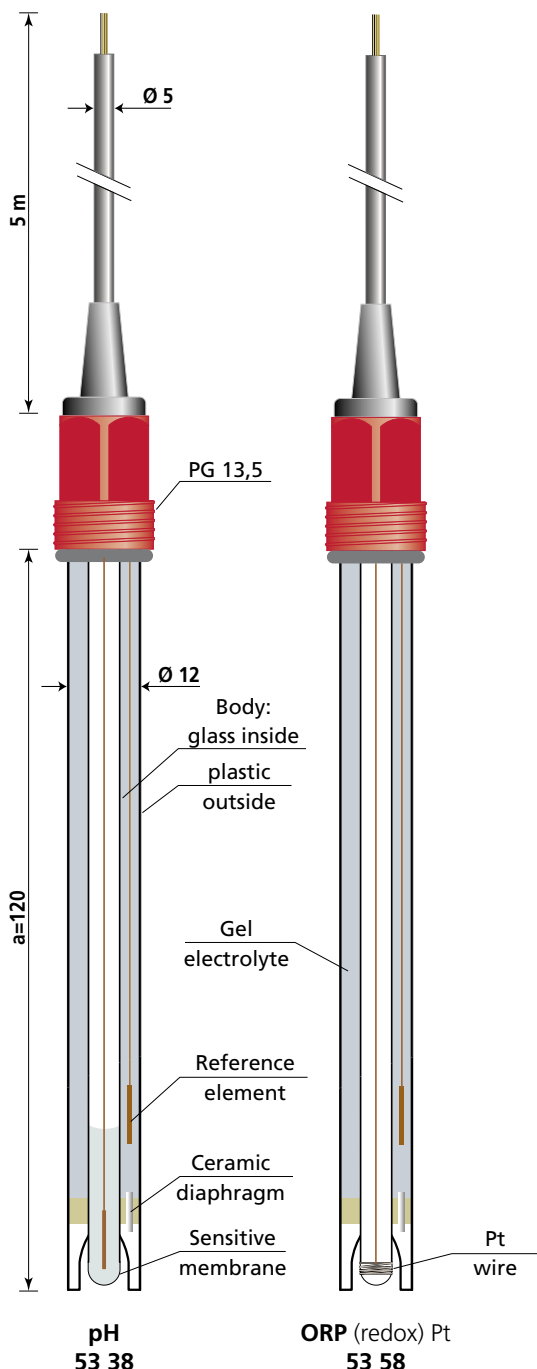
Electrode	53 30	53 34	53 50
Measuring range	0 ... 14 pH	0 ... 14 pH	±2000 mV
Temp. measurement	--	0...100 °C	--
Operating temp.	0...100 °C		
Temperature sensor	--	Pt 1000	--
Indicator metal	--	--	Pt
Max. operating press.	Up to 5 bar		
Reference system	"Sleeved" Ag/AgCl wire		
Electrolyte	Polyacrylic gel		
Contact diaphragm	Porous PTFE		
Thread	PG 13,5		
Connector, protection	S8, IP65	MP-4, IP65	S8, IP65
Body material	Glass		

pH and redox electrodes, fixed-cable

gel electrolyte

53 38, pH Electrode. 53 58, ORP electrode, platinum

These are fixed-cable electrodes, highly performant and very competitively priced.
The outside body of these electrodes is made of plastic.



Advantages

Resistant, economical electrodes.
No need to purchase a separate cable.

Disadvantages

Replacement of the electrode involves re-installing the cable.

Limitations

Solutions with very low conductivity.
Products with colloids or solids in suspension.
Samples containing sulphides, reducing sugars or other substances which react with silver ions.
Temperatures over 60°C.

Applications, examples

Swimming pools, drinking water.
Aqueous samples in general.

Mounting. See housings, pages 66...73

In immersion housings In 61, In 63 and In 68.
In insertion housings In 76, In 77 and In 78.
In flotation housings FL 60 and FL 69.
In flow-through chamber CR 60.

Cables

The electrode is supplied with a 5 m cable.
Electrodes with integrated BNC connector are also available.

Specifications

Electrode	53 38	53 58
Measuring range	0 ... 14 pH	±2000 mV
Indicator metal	--	Pt
Operating temperature	0...60 °C	
Max. operating pressure	Up to 2 bar	
Reference system	Ag wire coated with AgCl	
Electrolyte	Gel	
Contact diaphragm	Ceramic	
Thread	PG 13,5	
Body material	Polycarbonate and glass	

pH and redox (ORP) "housed" electrodes

gel electrolyte

pH
mV

53 40 pH electrode 53 56, ORP electrode, platinum.

This is a PVC housing with an integrated electrode.
The plastic body protects the sensor from possible impacts.

The two 3/4" NPT threads make installation easy.

Advantages

Highly-protected sensor.
Can be screwed directly onto pipes. Can also be mounted in cheap immersion housings.
Very competitively priced.

Disadvantages

During calibration and sensor cleaning, the cable makes them difficult to unscrew/screw.

Limitations

Samples at temperatures of more than 55°C.
Solutions with very low conductivity.
Products with colloids or solids in suspension.
Samples containing sulphides, reducing sugars or other substances which react with silver ions.

Applications, examples

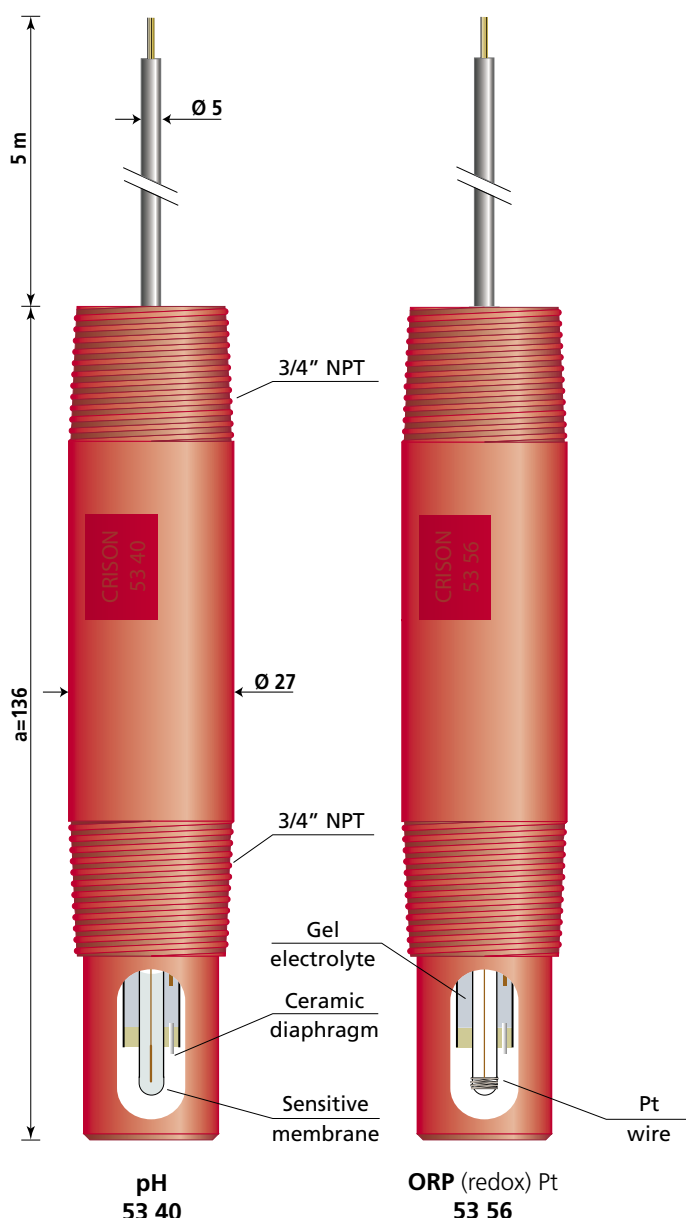
Aqueous samples in general.
Gas wash towers.
Wastewater.
"Clean" waters.
Tanks with stirred elements.

Mounting

Directly on pipes or reactors.
In immersion housings with 3/4" NPT thread.

Cables

Supplied with 5 m fixed-cable.
Electrodes with integrated BNC connector are also available.



Specifications

Electrode	53 40	53 56
Measuring range	0 ... 14 pH	±2000 mV
Indicator metal	--	Pt
Operating temperature	0...55 °C	
Max. operating pressure	Up to 6 bar	
Reference system	Ag wire coated with AgCl	
Electrolyte	Gel	
Contact diaphragm	Ceramic	
Thread	2 x 3/4" NPT	
Body material	PVC	

pH and redox electrodes for wastewater

polymer electrolyte

53 35, pH electrode

53 37, pH electrode with integrated Pt1000

53 55, ORP electrode, platinum

These are long-life electrodes. The open diaphragm facilitates direct contact between the reference electrolyte and the medium to be measured. Thanks to this contact, the classic problem of clogged diaphragms are a thing of the past.

The reference electrolyte is a solid polymer where variations in concentration take place very slowly, so that the reference potential remains invariable for a long time.

The electrodes with polymerised electrolyte have been especially designed to take measurements in highly-contaminated media, suspensions and emulsions.

Advantages

Large-scale contact between electrolyte and sample. Additional internal diaphragm which protects the reference element from contamination.

These electrodes last a relatively-long time in relation to conventional electrodes in difficult media.

Very competitively priced.

Model 53 37, with integrated ATC Pt1000 also allows simultaneous measurement of pH and temperature at the same point. Makes calibration easier.

Limitations

Rapid alteration of the polymer with:

- solutions with pH <2
- very clean, distilled and de-mineralised waters.
- temperatures above 80°C.
- pressures above 2 bar.

Applications, examples

Dirty waters, with mud, wastewater, etc.

Mounting. See housings, pages 66...73

In immersion housings In 61, In 63 and In 68.

In insertion housings In 76, In 77 and In 78.

In flotation housings FL 60 and FL 69.

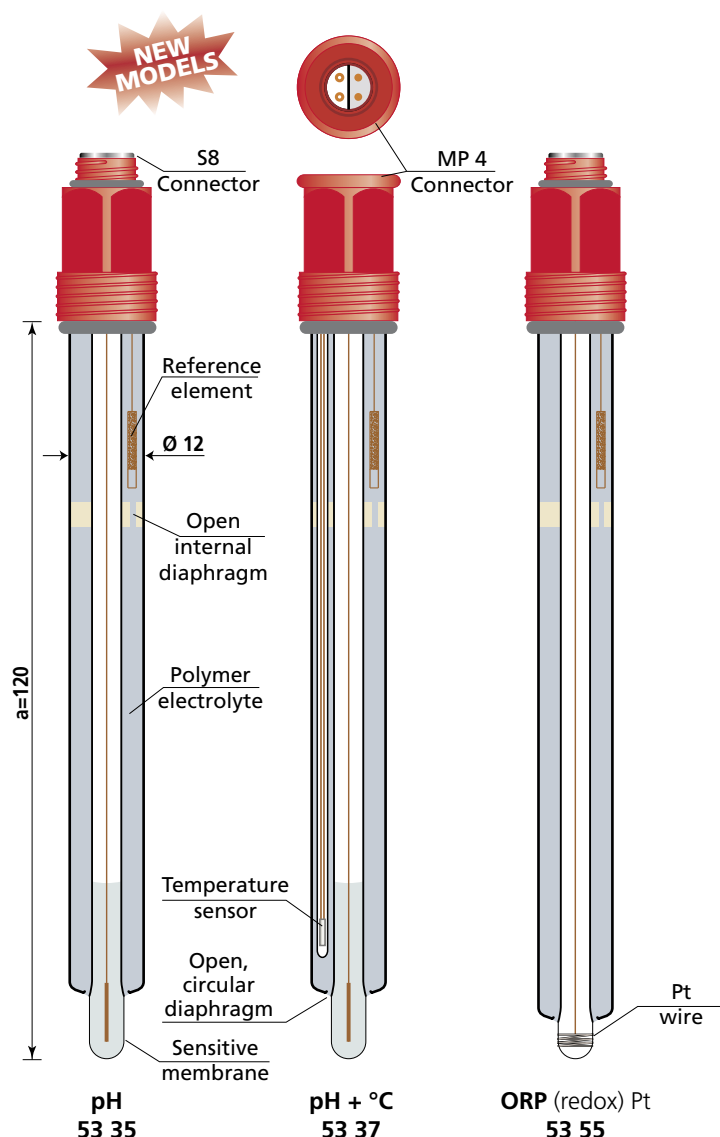
In flow-through chamber CR 60.

Cables

Connected to coaxial cables with AS9 connector.

53 37 uses cables with MP-4 connector.

(See page 75)



Specifications

Electrode	53 35	53 37	53 55
Measuring range	2 ... 14 pH	2 ... 14 pH	±2000 mV
Temp. measurement	--	0...80 °C	--
Operating temp.	0...80 °C		
Temperature sensor	--	Pt 1000	--
Indicator metal	--	--	Pt
Max. operating press.	Up to 2 bar		
Reference system	Encapsulated Ag/AgCl crystals		
Electrolyte	Polymer		
Contact diaphragm	Open, circular		
Thread	PG 13,5		
Connector, protection	S8, IP65	MP-4, IP65	S8, IP65
Body material	Glass		

pH electrode for extremely difficult media

polymer electrolyte



53 64 pH electrode.

This is a high-performance electrode. It uses a high-performance polymer electrolyte, which allows it to work under the most difficult conditions, 0... 14 pH and 0... 130°C.

Internal pressure compensator

The dilation of the polymer which takes place at a high temperature, is absorbed by compressing an internal elastomer, preventing the electrolyte leaking-out through the diaphragms.

Advantages

Its two open diaphragms improve electrode response and prolong its lifespan.
Clogging of diaphragms becomes impossible.
Large-scale contact between electrolyte and sample is guaranteed.
They can measure pH in samples at high temperatures.
They can be steam-sterilised or autoclaved.

Applications, examples

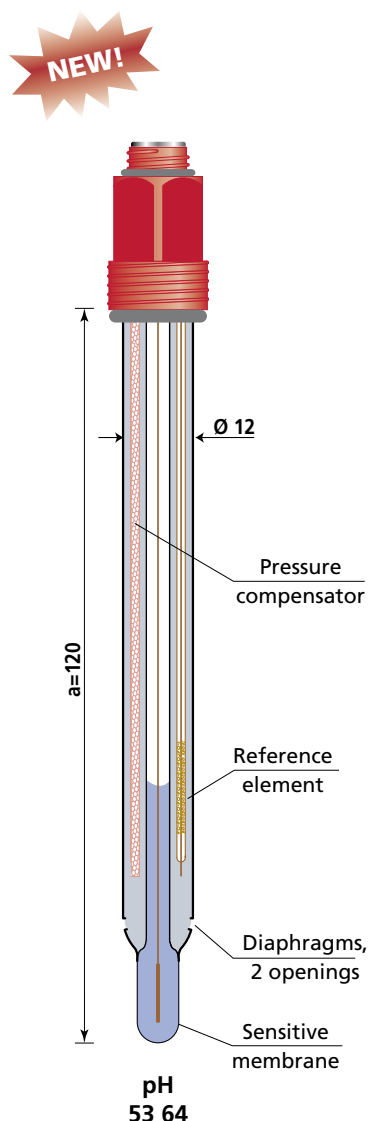
Samples with dyes, pigments and colourings.
Fermentation.
The sugar industry.
Oily samples.
Resistant to steam and autoclave sterilisation.
Resistant to CIP processes.
Organic solvents.

Mounting. See housings, pages 66...73

In immersion housings In 61, In 63 and In 68.
In insertion housings In 76, In 77 and In 78.
In flotation housings FL 60 and FL 69.
In flow-through chamber CR 60.

Cables

Connected to coaxial cables with AS9 connector.
(See page 75)



Specifications

Electrode	53 64
Measuring range	0 ... 14 pH
Operating temperature	0...130 °C
Max. operating pressure	Up to 6 bar
Reference system	Encapsulated Ag/AgCl crystals
Electrolyte	Polymer
Contact diaphragms	Open, 2 sides
Thread	PG 13,5
Connector, protection	S8, IP65
Body material	Glass



Temperature probes

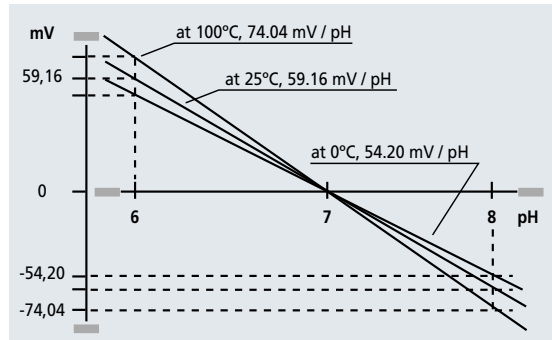
Automatic temperature compensation



Effects of temperature when measuring pH ...

... on the electrode

Nernst's Law says that the electrode slope varies according to temperature in a predictable manner.



pH-meters automatically compensate for this effect with what is known as Automatic Temperature Compensation.

To do this, the temperature of the sample must be given to the instrument. This can be done by:

- Connecting a temperature sensor to the pH-meter, in addition to the electrode.
- Using an electrode with an integrated temperature sensor, the main advantage of this being that it makes the installation easier. The two signals – pH and temperature – are transmitted to the instrument using a single sensor, a single probe and a single cable.
- Manually entering the temperature.
In some applications, temperature does not need to be measured, either because the temperature is constant or because a broad pH value is acceptable, etc. In these cases, the temperature of the sample can be entered manually using the instrument's keypad.

... on buffer solutions

Temperature makes each solution behave in a certain way.

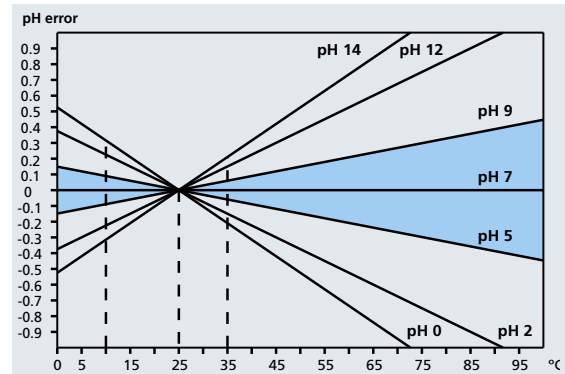
CRISON pH-meters have a built-in table of the pH values of buffer solutions at different temperatures, to perform correct calibration at any temperature.

... on a given sample

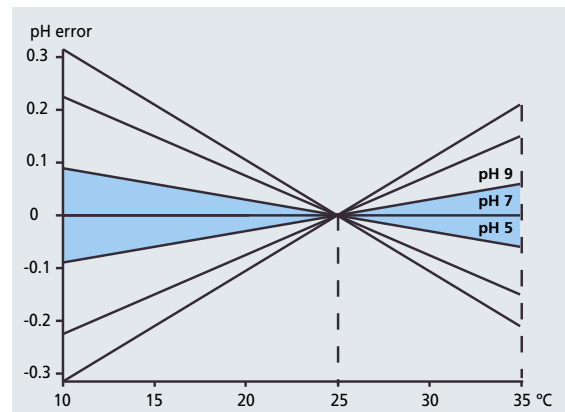
Temperature makes the pH of products vary in different ways, so the instrument cannot compensate for this variation. Therefore, the pH value and the temperature at which the measurement was taken must always be reported together.

... on waters in general

The pH value of waters is normally between 5 and 9. Errors committed by not taking the temperature into account are practically negligible, between 10 and 35°C, see graphs.



Errors in pH measurement without temperature compensation, between 0 and 100°C



Detail of the 10 to 35°C section of the above diagram

Effects of temperature when measuring ORP (redox) ...

... on the electrode

Temperature has no effect whatsoever on metal electrodes.

... on a given sample

The oxidation-reduction potential of a sample depends on temperature. However, pH-meters do not provide any type of compensation on the mV scale. In this case, connecting a temperature sensor to the pH-meter will serve only to determine the temperature of the sample.

Temperature compensators

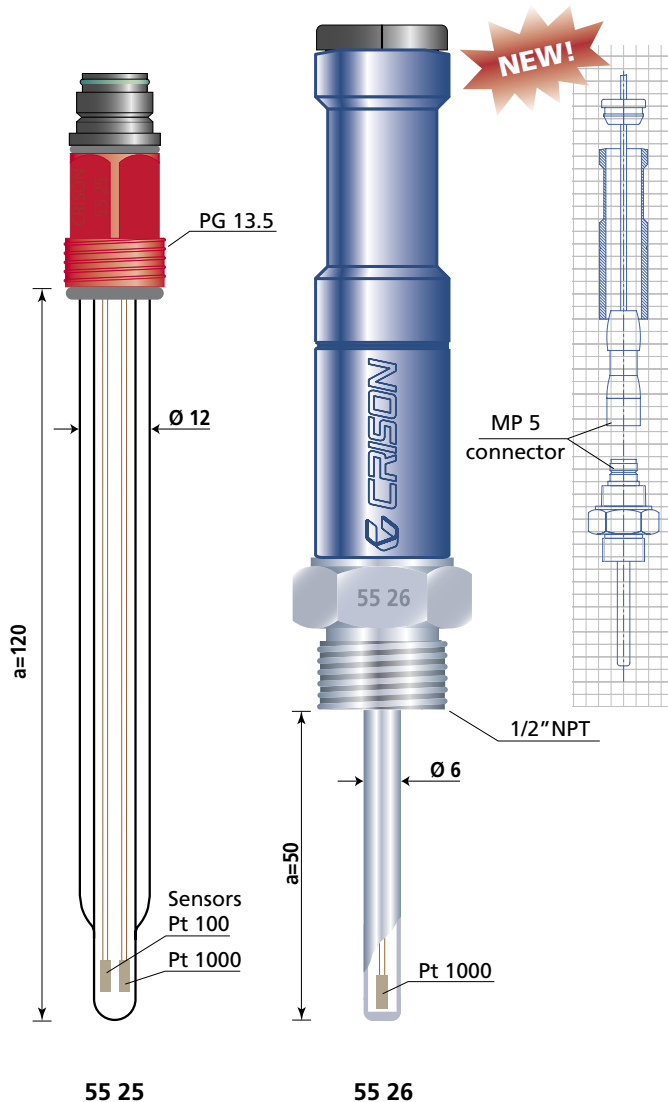
55 25, temperature probe Pt 100 + Pt 1000. 55 26, temperature probe Pt 1000.

By connecting one of these probes to our pH-meters, the user can measure pH and temperature simultaneously and display both values on-screen. This feature allows the user:

- To compensate for the effect of temperature on the electrode.
- To use the pH-meter as a precision thermometer. These sensors have a long lifespan. Unless broken, they will last a lifetime.

The **55 25 temperature compensator** is a double temperature probe, with 2 TDR sensors, the Pt 100 and the Pt 1000. It is held fast using a PG 13.5 thread, which means it can be mounted in CRISON housings.

The **55 26 temperature compensator** is fixed directly onto the pipe thanks to its 1/2" NPT thread.



Advantages

Because it has two sensors, one Pt 100 and the other Pt 1000, the 55 25 probe is compatible with both kinds of instrument.

The 55 26 probe is very robust, thanks to its stainless steel sheath. It is mounted directly onto pipes.

Pt 100/Pt 1000

Traditionally, the most commonly-used precision temperature sensors were the Pt 100 type, with a temperature-dependent resistance (TDR) of 100 Ω at 0°C and a coefficient of 0.38 $\Omega / ^\circ\text{C}$.

Nowadays people are increasingly using Pt 1000 probes, $R = 1000 \Omega$ at 0°C and 10-times greater coefficient. This makes measuring temperature easier and reduces the distortion caused by the length of the cable.

Mounting

55 25 Temperature probe: In immersion housings In 61, In 63 and In 68. In insertion housings In 76, In 77 and In 78.

Because they must always be installed next to pH electrodes, CRISON recommends the use of a "multisensor" housing like the In 68, which allows a maximum of 3 sensors to be mounted together.

In flotation housings FL 60 and FL 69.

In flow-through chamber CR 60.

(See pages 67-73).

55 26 Temperature probe: directly onto pipes.

Cables

They are connected using multiple cables with MP-5, 5-contact multipin connector.

(See page 75)

Specifications

Model	55 25	55 26
Sensor type	Pt 100 and Pt 1000 ⁽¹⁾	Pt 1000
Operating temperature	-20...135 °C	
Max. operating pressure	Up to 6 bar	
Number of sensors	2	1
Thread	PG 13.5	1/2" NPT
Connector, protection	MP-5, IP67	
Body material	Pyrex glass	Stainless steel

(1) Can be made to order with both Pt 100 or Pt 1000 sensors



Solutions

pH buffer solutions and redox standard solutions

NIST-traceable pH buffer solutions

To measure pH correctly, the electrode-instrument set needs to be calibrated regularly with buffer solutions. CRISON supplies three ready-to-use solutions. At 25 °C, their pH values are 4.01, 7.00 and 9.21.

Composition

pH 7.00 buffer: Potassium and di-sodium phosphates

pH 4.01 buffer: Potassium hydrogen phthalate

pH 9.21 buffer: Borax.

They also contain germicide.

Properties

These are technical buffer solutions and are prepared in accordance with the DIN 19267 standard. They are contrasted with standard reference material (SRM) from the National Institute of Standards & Technology, NIST, in line with DIN 19266.

The pH **tolerance** range is ± 0.02 pH.

Buffer capacity: $\beta = 0.02$ mol/l per pH unit. Dilution value: $\Delta\frac{1}{2} \leq 0.052$ pH.

Shelf life: At least 2 years if stored correctly.

No colourings; they do not contaminate the electrode.

Immune to micro-organisms.

Economical. They can be used repeatedly,

thanks to their excellent buffer capacity. For this we recommend the use of calibration flasks.

pH values at different temperatures

°C	pH		
0	4.01	7.12	9.52
10	4.00	7.06	9.38
20	4.00	7.02	9.26
25	4.01	7.00	9.21
30	4.01	6.99	9.16
40	4.03	6.97	9.06
50	4.06	6.97	8.99
60	4.10	6.98	8.93
70	4.16	7.00	8.88
80	4.22	7.04	8.83
90	4.30	7.09	8.79

Certificate of Analysis

CRISON recommends an alkaline buffer solution of pH 9.21 (25°C) because it is more stable than solutions with higher values.

Each CRISON buffer solution is supplied with a certificate of analysis that indicates: uncertainty, traceability, composition, batch number and expiry date. (See page 79)

Redox standard solutions

These solutions are designed to check the redox (oxidation-reduction potential, ORP) measuring systems quickly.

CRISON offers a solution with a value of 220 mV at 25°C.

Composition

The 220 mV standard redox solution is a mixture of iron salts and pH 7 buffer.

It has a neutral pH, approximately 7, which allows verification of all types of Pt electrode, regardless of which reference system is used.



The tolerance for mV values is ± 10 mV.

mV values at different temperatures

°C	mV
10	245
15	236
20	228
25	220
30	212
35	204
40	195
50	178
60	160
70	142



Code	Description
94 63	pH 4.01 buffer, 250 ml.
94 64	pH 7.00 buffer, 250 ml.
94 65	pH 9.21 buffer, 250 ml.
94 00	220 mV redox standard, 250 ml.

Electrolyte solutions and electrode regenerators



Electrolyte solutions

An important part of the maintenance of liquid electrolyte electrodes is to check the level of the reference electrolyte and refill when necessary. The reference electrolyte is also used to refill the protective cap of the membrane when the electrode is not being used.

CRISOLYT

CRISOLYT is a solution of KCl 3M. It is the electrolyte normally used in electrodes with "liquid electrolyte".



CRISOLYT-V

CRISOLYT V is a highly viscous 3M KCl and tylose solution.

This electrolyte is used in liquid electrolyte electrodes to reduce electrolyte flow and hence

the frequency with which the electrolyte has to be refilled.

CRISOLYT-G, for specific applications

CRISOLYT-G is a KCl solution in which much of the water is replaced by glycerine. The high glycerine content prevents a reaction between the KCl and the proteins in the medium. This prevents early blockage of the diaphragm, extends the life of the electrode and above all, ensures that the electrode operates soundly.

This electrolyte is recommended for measuring in:



- samples with a high protein content.
- partially organic samples.
- samples containing oils.
- low temperature samples.
- general industrial processes.

Regenerating solutions

In some cases, these solutions can correct operating anomalies in pH and redox electrodes.

The most common symptoms of an electrode in need of regeneration are:

- slow response.
- high asymmetry potential.
- poor sensitivity

CRISON supplies three electrode-regenerating solutions.

Electrode cleaner with pepsin

This is a solution of HCl 0.1 M, enriched with pepsin, with a pH of approximately 1.

It is recommended for the regeneration of electrodes that usually measure samples with a high protein content (such as milk, cheese, meat, blood, serum, etc...).

The electrode is cleaned by removing the proteins thanks to the hydrolysing capability that pepsin displays in acidic mediums.

Never to be used on polymer electrolyte electrodes which are not pH <2 resistant.

Diaphragm cleaner

This is a solution of thiourea in HCl 0.1 M, pH ≈ 1.

Appropriate for eliminating the black deposit which forms on the ceramic diaphragm of the electrode.

The "black" diaphragm appears when an electrode is used with an Ag/AgCl wire reference in samples containing sulphides, reducing substances, etc. The silver salts clogging the diaphragm are dissolved in the thiourea solution.

Membrane reactivator

This is a solution with 1-2 % HF.

It is recommended for reactivating pH electrodes with a slow response or poor sensitivity. The hydrofluoric acid renews the hydrated gel layer of the membrane. This solution is useful when others have not worked, although success cannot be guaranteed.

If used on polymer electrolyte electrodes, only the glass membrane should be immersed, never the diaphragm.

Code	Description
95 00	CRISOLYT, KCl 3M, 250 ml
95 02	CRISOLYT-G, KCl + glycerine, 250 ml
95 03	CRISOLYT V, KCl + tylose, 250 ml
96 00	Electrode cleaner with pepsin, 250 ml
96 10	Diaphragm cleaner, 250 ml
96 20	Membrane reactivator, HF, 250 ml



Form for configuring a pH or ORP (redox) measurement system

On this page, we have placed the elements most frequently used in a measuring system.

To make it easier for you to place an order or request an up-to-date offer, please fax us a photocopy of this page.

This form can also be completed on our webpage: www.crison.es

Please tick ☒ the elements of interest to you.

pH-meter (page 10)

- ☐ 27 02 PH 27 P, panel, 230 V A/C*.
- ☐ 28 00 PH 28, field, 230 V A/C*.
- ☐ 28 02 PH 28 P, panel, 230 V A/C*.
- ☐ 29 00 PH 29, field, 230 V A/C*.
- ☐ 29 02 PH 29 P, panel, 230 V A/C*.

* Power supply 24 V A/C, see codes on page 11.

pH electrode... (pages 24-31)

- ☐ 53 30 ...gel electrolyte, large diaphragm.
- ☐ 53 31 ...pressurised gel electrolyte.
- ☐ 53 33 ...gel electrolyte.
- ☐ 53 34 ...gel electrolyte, large diaphragm, with ATC
- ☐ 53 35 ...solid electrolyte.
- ☐ 53 37 ...solid electrolyte, with ATC.
- ☐ 53 38 ...fixed-cable.
- ☐ 53 40 ...housed electrode.
- ☐ 53 41 ...gel electrolyte, HF resistant.
- ☐ 53 64 ...for difficult media.
- ☐ 53 65 ...sterilisable a=120
- ☐ 53 66 ...sterilisable a=250

ORP electrode (pages 25-30)

- ☐ 53 50 ...gel electrolyte, large diaphragm, platinum.
- ☐ 53 51 ...pressurised gel electrolyte, platinum.
- ☐ 53 53 ...gel electrolyte, platinum.
- ☐ 53 54 ...gel electrolyte, gold.
- ☐ 53 55 ...solid electrolyte, platinum.
- ☐ 53 56 ...housed electrode, platinum.
- ☐ 53 58 ...fixed-cable, platinum.

Temperature compensator (ATC) (page 34)

- ☐ 55 25 Pt 100+Pt 1000 probe, MP-5.
- ☐ 55 26 Pt 1000 probe, MP-5.

"Single sensor" immersion housing (page 69)

- ☐ 61 01 In 61, in PVC. L = 800 mm
- ☐ 61 02 In 61, in PVDF. L = 800 mm
- ☐ 61 31 In 61, in PVC. L = 1,600 mm
- ☐ 61 32 In 61, in PVDF. L = 1,600 mm
- ☐ 63 01 In 63, self-cleaning, in PVC. L = 800 mm
- ☐ 63 02 In 63, self-cleaning, in PVDF. L = 800 mm
- ☐ 63 31 In 63, self-cleaning, in PVC. L = 1,600 mm
- ☐ 63 32 In 63, self-cleaning, in PVDF. L = 1,600 mm

"Multisensor" immersion housing (page 70)

- ☐ 68 01 In 68, self-cleaning, in PVC. L = 800 mm
- ☐ 68 31 In 68, self-cleaning, in PVC. L = 1,600 mm

"Flotation" housing (page 71)

- ☐ 60 00 FL 60, in PVC.
- ☐ 69 01 FL 69, multisensor, in PVC.

Insertion housing (page 72)

- ☐ 76 01 In 76 in PVC.
- ☐ 77 01 In 77, in PVC.
- ☐ 77 02 In 77, in PVDF.
- ☐ 78 01 In 78, stainless steel.

Flow-through chamber (page 73)

- ☐ 60 03 CR 60 in PVC.

3-piece adapter (page 76)

- ☐ 61 08 DN 50, modified, in PVC.

Weld-in socket (page 76)

- ☐ 61 09 Straight in PVC.
- ☐ 61 12 Straight in PVDF.
- ☐ 61 14 Straight in PP.
- ☐ 61 21 Straight in stainless steel.

- ☐ 61 10 Inclined in PVC.
- ☐ 61 13 Inclined in PVDF.
- ☐ 61 15 Inclined in PP.
- ☐ 61 22 Inclined in stainless steel.

Cable (page 75)

- ☐ 10 03 Coaxial AS9 connector, 3 m.
- ☐ 10 05 Coaxial AS9 connector, 5 m.
- ☐ 10 10 Coaxial AS9 connector, 10 m.
- ☐ 10 15 Coaxial AS9 connector, 15 m.
- ☐ 10 20 Coaxial AS9 connector, 20 m.
- ☐ 10 25 Coaxial AS9 connector, 25 m.
- ☐ 90 XX Multiple connector MP-5, X m.
- ☐ 93 XX Multiple connector MP-4, X m.

Specify code and length

Solutions (pages 36-37)

- ☐ 94 63 Buffer pH 4 mV, 250 ml.
- ☐ 94 64 Buffer pH 7 mV, 250 ml.
- ☐ 94 65 Buffer pH 9.21 mV, 250 ml.
- ☐ 94 00 Standard 220 mV, 250 ml.

ISO calibration certificate (page 80)

- ☐ 89 21 for PH 27, PH 28 or PH 29.

Other accessories

- ☐ 68 99 PG 13.5 screw-cap

- ☐
- ☐
- ☐
- ☐

Price list

- ☐ Printed
- ☐ Excel format

Form for studying and defining a pH or ORP measurement system



If you require advice from our technicians when choosing the equipment required to monitor your process, please fill in this form and send it to us. We will contact you shortly with our proposal or offer.
This form can also be completed on our webpage: www.crison.es

Environment

Application			
Measurement in	tank ☐	pipe ☐	pressurised reactor ☐
Material the tank or pipe is made of	PVC ☐	PVDF ☐	stainless steel ☐ other ☐
Pipe diameter	cm		
Ambient operating temperature	°C		
Relative humidity	%		

Process characteristics

Sample type			
Viscosity	cp		
Density	Kg/m³		
Temperature (°C)	min.	normal	max.
Pressure (bar)	min.	normal	max.
pH	min.	normal	max.

Sensor, pH/redox electrode, temperature compensator

Mesuring range (pH/mV)	from	to	pH ☐	mV ☐
Temperature range (°C)	from	to		
Pressure range (bar)	from	to		
Temperature compensators	no ☐	external ☐	built-in ☐	
Sterilisation	yes ☐	no ☐		

Cable

Length	m
Temperature resistance	°C

Housing

Housing type	immersion ☐	insertion ☐	flotation ☐	other ☐
Immersion length	800 mm ☐	1600 mm ☐	other ☐	
Material	PVC ☐	PVDF ☐	steel ☐	other ☐
With cleaning device	yes ☐	no ☐		

Transmitter

Mounting	panel ☐	field ☐		
Power supply	24V A/C ☐	230V A/C ☐	other ☐	
Limit Relays	1 ☐	2 ☐	none ☐	
Control	no ☐	on/off ☐	proportional ☐	
Sensor cleaning relay	yes ☐	no ☐		
Alarm relay	yes ☐	no ☐		



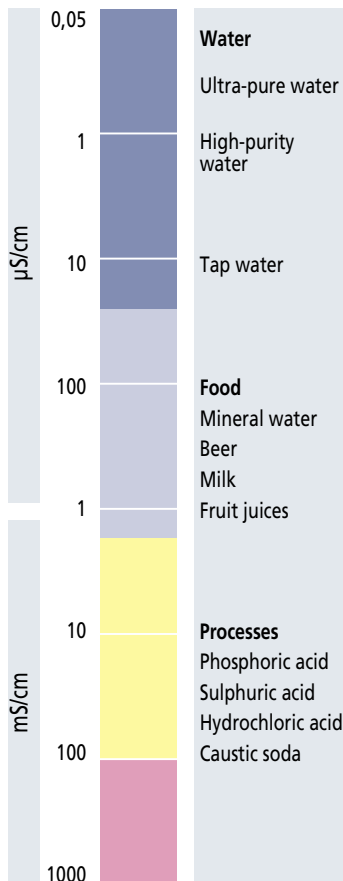
Conductivity meters

Continuous measurement of conductivity

Conductivity is one of the most important parameters to bear in mind when monitoring clean or wastewater.

Electrical conductivity is a measurement of the total concentration of ions in a solution. By measuring conductivity, the user can determine how pure the water is and the concentration of salts in dirty and wastewater. It is not a selective measurement.

The scale of conductivity of aqueous solutions starts with a value of 0.05 $\mu\text{S}/\text{cm}$ (25°C) for ultra-pure water. Natural, surface or drinking waters are about 100 to 1000 $\mu\text{S}/\text{cm}$. The highest values are found with highly-concentrated bases, e.g. NaOH, with values of more than 1000 mS/cm.



The effect of temperature

The conductivity of a solution is highly dependent on temperature.

This has a dual effect on electrolytes: it affects how far they dissolve and ion mobility.

Conductivity meters automatically correct the conductivity value of a solution to refer it to 25°C, which is the reference temperature normally used (UNE EN 27888). That is why all CRISON cells have a temperature sensor inside.

This allows the effect of temperature on the sample to be compensated automatically. There are various procedures on the market for measuring conductivity:

- with two electrodes, the system used for water treatment and standard applications.
- with four electrodes, used in dirty media with high conductivity levels.
- by induction, used with very high conductivity and in highly-corrosive media.

CRISON conductivity meters use the "two-electrode" technology.

When measuring in dirty media, e.g. wastewater, deposits can form on the cell.

To remove them, CRISON recommends that the cell be mounted in housings with an auto-cleaning device.

Measuring equipment

A complete system for measuring conductivity includes these basic components:

- The conductivity cell.
- The temperature sensor, inserted in the cell.
- The instrument.

Applications

Continuous conductivity measurement systems have fields of application as varied as controlling the quality of drinking and ultra-pure water, determining unspecified impurities in industrial processes or monitoring the concentration of salts in water flowing into wastewater treatment plants.

Examples of applications depending on the scale of measurement:

Low conductivity (clean waters)

- Steam generation, (water for boilers, and from condensation).
- Manufacture of semiconductors, production of ultra-pure water and cleaning of integrated circuits.
- Reverse osmosis
- Demineralisation, using exchange columns.
- Leak tests in heat exchangers.
- Drinking and surface waters.

Medium and high conductivity

- Municipal and industrial water treatment plants.
- System and well water.
- Drinking water purification.
- Cooling water.
- Cleaning baths.
- Wastewater.
- etc.

Field and panel conductivity meters

These are specific instruments for measuring and, in some cases, controlling conductivity and temperature in continuous processes. CRISON conductivity meters are extremely safe instruments. There are different versions for panels and field-work depending on location requirements.

Main features

The conductivity and temperature values of the sample and reference temperature are displayed simultaneously on-screen (automatic temperature compensation).

The display is backlit, which aids reading in dark places.

When calibrated, the instruments automatically recognise standards, and it is possible to connect the cells from the CRISON programme to them.

These instruments are very easy to use and offer interactive dialogue in the user's own language (Spanish, English, French and Italian).

A security code prevents unauthorised personnel from interrupting measurement processes. Only authorised personnel can calibrate or program the equipment.

During calibration and programming, the instrument remains "on hold".

The instruments have an 4...20 mA analogue output for integration into automated processes.

Moreover, signals of 21 and 22 mA

notify the user that the equipment is on hold or in alarm status, respectively.

The field versions have a watertight transparent cover to protect the keypad and display. The panel version is specifically designed for mounting on standardised panels.

CM 38

Available in both field and panel versions.

With two relays, one for limit and one for alarm.

Performs *on/off* regulation.

Works with a fixed temperature coefficient (TC) of 2%/°C.

CM 39

Available in both field and panel versions.

The features which distinguish it from the CM 38 are:

- Three relays. 1 for limit, 1 for alarm and a third one to be used either as a limit or cell cleaning relay.

- The user can adjust the temperature coefficient, TC, between 0 and 5%/°C.

- As well as classic calibration with conductivity standard solutions, it allows the user to perform indirect calibration.

- *Data logger* for storing up to 200 measurements. The data can be memorised at a scheduled frequency or, for example, when measurements are outside limits.

- Possibility of verifying relays and 4...20 mA output during installation.

Certificates

Both models are supplied with the EC Declaration of Conformity as per EMC directives 73/23/EC on low-voltage devices and 89/336/EC, and with specifications certificate.

For further information on Certificates, refer to pages 79-80



CM 38

CM 39

CM 38 P

CM 39 P

Display examples

CM 38 and CM 39

During start-up

...select language

```
IDIOMA  >Español
         Italiano
```

```
         Français
         English
```

... and the instrument automatically goes to:

```
MEASURING 22.3°C
545 µS/cm @25°C
```

During calibration

...enter the access code

```
CODE 000
```

...and follow the instructions

```
18.0°C
Insert 1st standard
```

```
18.0°C
Insert 2nd standard
```

...etc.

Other messages which may appear

..."out of limit" measurement message

```
>LIMIT< 22.3°C
835 µS/cm @25°C
```

..."alarm" warning

```
>ALARM< 22.3°C
835 µS/cm @25°C
```

...etc.

Keypad

The whole range of functions can be accessed using only four keys and the "intelligent" display, without having to consult the user manual.



CM 39

Indirect calibration.

```
Measuring 23.2°C
545 µS/cm @25°C
```

↓ ENT (2s)

```
Readjusting 545 µS/cm @25°C
```



```
Readjusting 545 µS/cm @25°C
```

...sensor "cleaning" warning.

```
WASHING
```

```
3s
```

... storing data in *Data logger*

```
Measuring >DL<
545 µS/cm @25°C
```

...checking data

```
001 12-10 15:00
600 µS/cm @25°C
```

```
002 12-10 15:15
602 µS/cm @25°C
```

...etc.

N.B.: See page 54
to configure a
complete system

Code	Description
38 00	CM 38 field conductivity meter, 230 V
38 01	CM 38 field conductivity meter, 24 V
38 02	CM 38 P panel conductivity meter, 230 V
38 03	CM 38 P panel conductivity meter, 24 V
39 00	CM 39 field conductivity meter, 230 V
39 01	CM 39 field conductivity meter, 24 V
39 02	CM 39 P panel conductivity meter, 230 V
39 03	CM 39 P panel conductivity meter, 24 V

conductivity meters...

Technical specifications. Comparison table

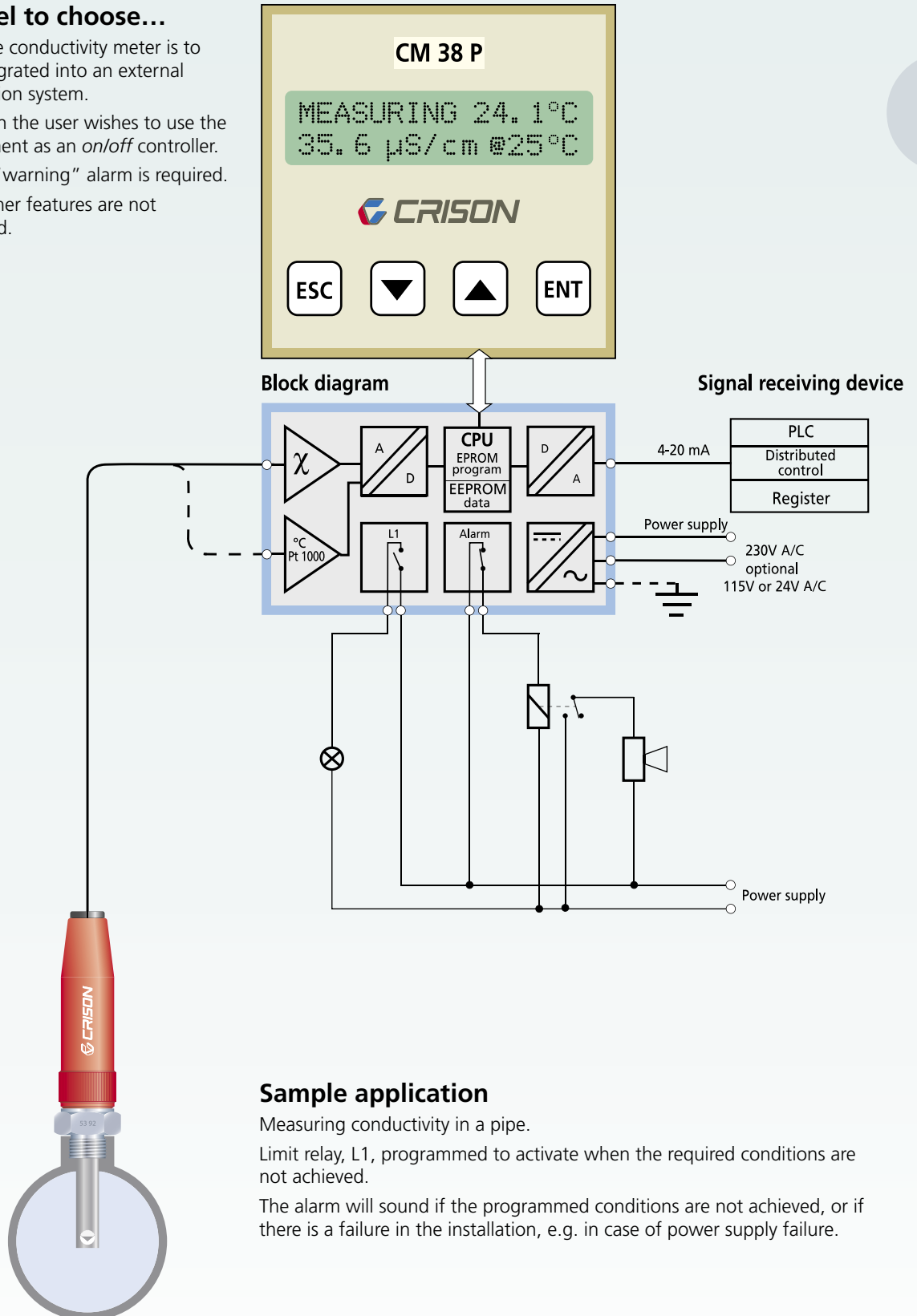
Model		CM 38 CM 38 P	CM 39 CM 39 P
Measuring range	Conductivity: 0.1 $\mu\text{S} / \text{cm}$...200.0 mS Temperature: -20.0...150.0 °C	•	•
Resolution	Conductivity: according to range and constant of cell used. Temperature: 0.1 °C	•	•
Measuring error (± 1 digit)	Conductivity: $\leq 1\%$ of value measured Temperature: ≤ 0.3 °C	•	•
Reproducibility (± 1 digit)	Conductivity: $\pm 1\%$. Temperature: ± 0.1 °C	•	•
Automatic temperature compensation	With Pt 1000 probe Entering data via keypad	•	•
Temperature compensation method	Fixed TC of 2%/°C Variable TC between 0 and 5%/°C	•	•
Reference temperature	25°C 20 or 25°C	•	•
Calibration options	With 2 standards With 1, 2 or 3 standards Indirect calibration to any conductivity value	•	• •
Recognised standards (at 25°C) Values between 15 and 30°C in memory	147 $\mu\text{S}/\text{cm}$, 1413 $\mu\text{S}/\text{cm}$ and 12.88 mS/cm		•
Accepted cell constant	From 0.1 to 10 cm^{-1} ($\pm 30\%$ of the nominal value, selected manually)	•	•
Analogue output, programmable galvanically insulated (R max. = 500 Ω)	4...20 mA for measurements. The scale can be selected. 21 mA or last value measured for instrument on hold 22 mA as alarm signal	• • •	• • •
Control modes	On/Off	•	•
Relays, delayed activation Potential-free Maximum load CA < 250 V, < 3 A, < 750 VA.	1 for limit. Contact NO. 1 for limit or cleaning. Contact NO (Relay switch) 1 for alarm. Contact NC	• • •	• • •
Verifying installation	Relay activation Output 4-20 mA		• •
Data logger	Memory capacity 200 data entries		•
Language	Spanish, English, French and Italian	•	•
Display	LCD, alphanumeric, backlit, 2 lines of 16 characters.	•	•
Length of cell cable	Recommended ≤ 25 m.	•	•
Power supply	230 or 24 V A/C $\pm 10\%$, 45-65 Hz (115 V A/C special order) Consumption 4 VA Protection: Class II. Surge category: II	• • •	• • •
Electrical safety	As per EN 61010-1 Norm	•	•
E.M.C. (electromagnetic compatibility)	As per EN 50081-1, EN 0051-2, EN 50082-1, EN 0052-2	•	•
Ambient conditions	Operating temperature: -20...55°C. Storage: -20...70°C Relative humidity, not condensed, < 80% Maximum altitude: 2000 m at 230 V, 3000 m at 24 V.	• • • •	• • • •
Enclosure	Field versions: Thermoplastic material, IP 55 protection Panel versions: PPE, ether polyphenylene, IP 54 Protection	• •	• •
Physical parameters	Field versions: Weight 700 g. Size 105x170x100 mm. Panel versions: Weight 600 g. Size 96x96x100 mm.	• •	• •

Specifications subject to change without notice

Diagram of a conductivity measuring system using the CM 38 or 38 P

Model to choose...

- ... if the conductivity meter is to be integrated into an external regulation system.
- ... when the user wishes to use the instrument as an *on/off* controller.
- ... if a "warning" alarm is required.
- ... if other features are not required.



Sample application

Measuring conductivity in a pipe.

Limit relay, L1, programmed to activate when the required conditions are not achieved.

The alarm will sound if the programmed conditions are not achieved, or if there is a failure in the installation, e.g. in case of power supply failure.

Diagram of a conductivity measuring system using the CM 39 or 39 P

Model to choose...

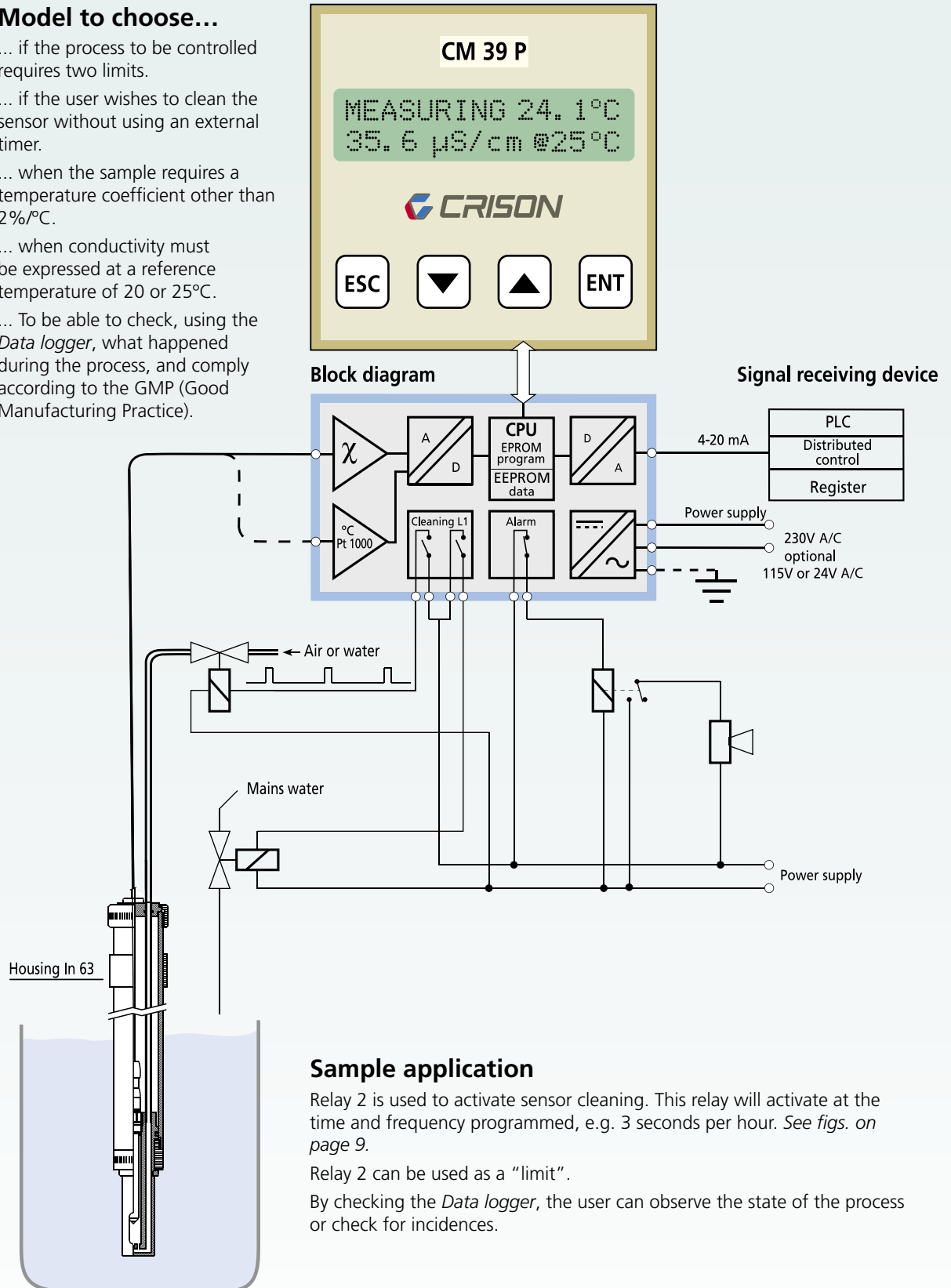
... if the process to be controlled requires two limits.

... if the user wishes to clean the sensor without using an external timer.

... when the sample requires a temperature coefficient other than 2%/°C.

... when conductivity must be expressed at a reference temperature of 20 or 25°C.

... To be able to check, using the *Data logger*, what happened during the process, and comply according to the GMP (Good Manufacturing Practice).



Conductivity and temperature simulator, SI 85

At last! A replacement for the classic "decade resistance boxes"!

The SI 85 switches an array of high-precision resistances electronically. It simulates values of conductivity using resistances. Similarly, it also simulates different temperature values, which helps the user check the temperature scale of conductivity meters.

The SI 85 is an ideal tool for checking complete installations for monitoring conductivity in industry. It is also an instrument for checking and auto-calibrating laboratory conductivity meters.

Key features

The simulated values cover the whole normal scale, from 1 μS , to 100 mS.

The **real value** of the simulated conductivity or temperature is **displayed on-screen**.

Highly stable simulated values.

Long life membrane keypad, for industrial use.

IP 65 protection.

The instrument can simulate:

- 6 different values of conductivity
- 6 values as a Pt 100 sensor
- 6 values as a Pt 1000.

See specifications.

Signal output comes from an MP-5 connector, which is adapted to standard CRISON conductivity cables.

The instrument **automatically switches off** if no keys are pressed for 5 minutes.

This function can be disabled by the user.

Uses very little electricity. With the instrument on, the batteries will last approximately 180 hours. Low battery level indicated.

Practical carry-case, optional, for protection and transport of the instrument.

Operation

The SI 85 software is similar to that of all other CRISON portables, and has been designed to make using this new range of instruments as easy as possible.

Certificates

The SI 85 is supplied with the **Specifications Certificate** and the EC Declaration of Conformity as per directive EMC 89/336/EC.

Instruments with code 85 02 are supplied with an **ISO Calibration Certificate**, issued by the CRISON calibration lab.

For further information, please refer to pages 79-80.

Re-calibration

There is very little drift over time in the SI 85, thanks to its high-quality components.

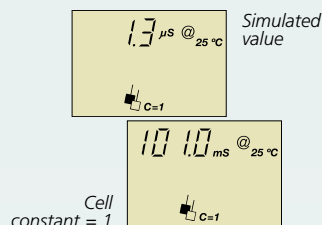
However, to ensure that the simulated values are exact, CRISON recommends annual calibration.



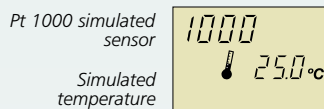
SI 85 (continued)

Display examples

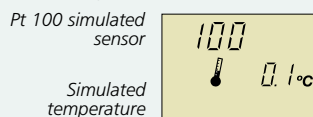
Simulation X



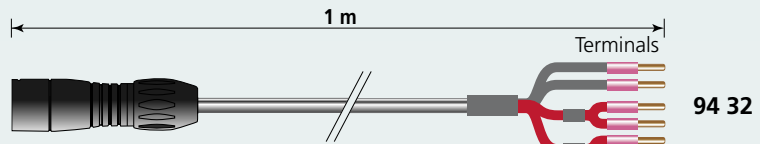
Temperature simulation (Pt 1000)



Temperature simulation (Pt 100)



Cables for connecting the SI 85 to different conductivity meters.



MP-5 connector, directly connectable to cell cable.

Code	Description
85 00	SI 85 Simulator
85 01	SI 85 Simulator, with carry-case
85 02	SI 85 Simulator, with carry-case and calibration certificate
94 32	Cable for connecting the SI 85 to industrial conductivity meters, CM 38, CM 39, etc.

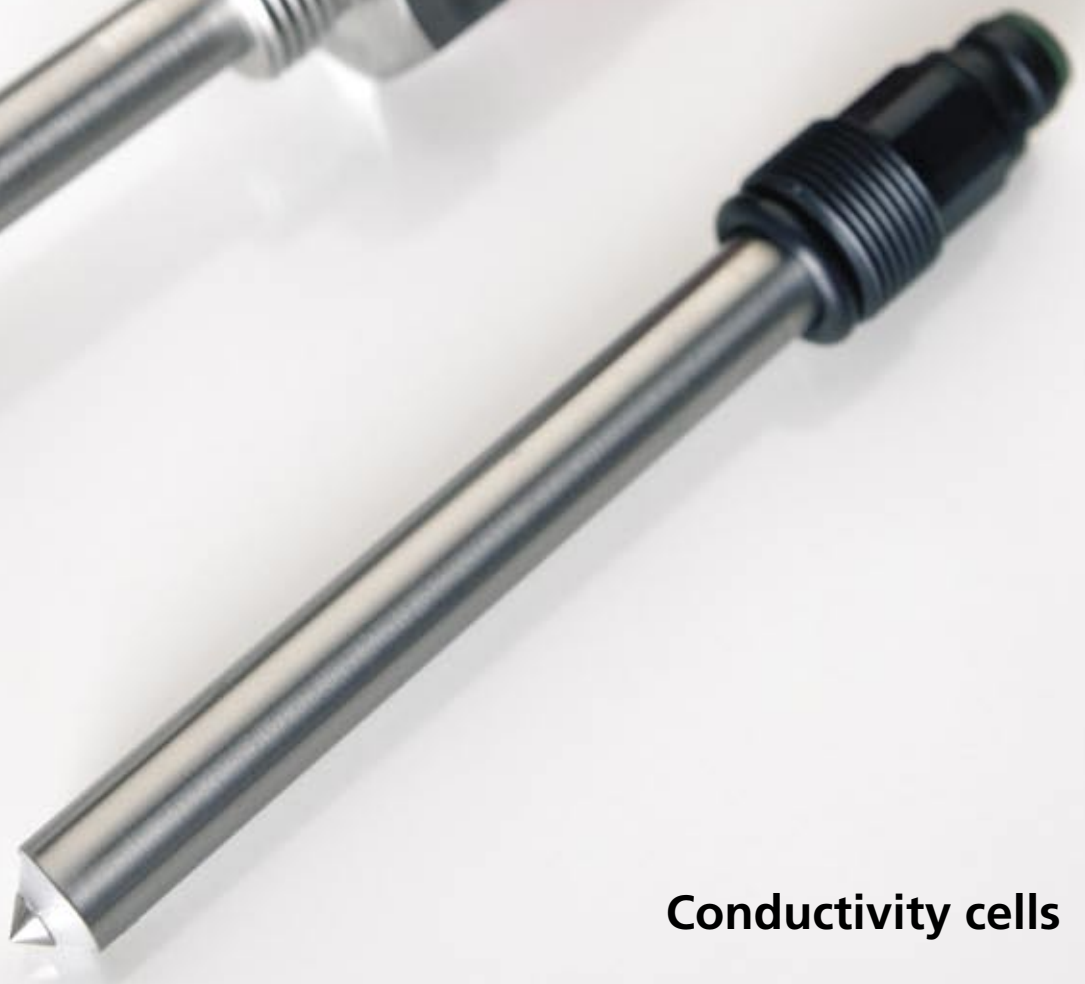
Specifications

Simulated values*	Conductivity	1.0, 10.0, 100.0, 1000 μS and 10.00, 100.0 mS (at 25°C)
	Temperature, Pt 100	-23.0, 0.0, 25.0, 50.0, 100.0 and 200 °C
	Temperature, Pt 1000	-23.0, 0.0, 25.0, 50.0, 100.0 and 200 °C
Resolution	Conductivity	Depending on value simulated
	Temperature	0.1 °C
Error (±1 digit)	Conductivity	≤ 0.2%, scale 100 mS ≤ 1%
	Temperature	≤ 0.1 °C
Reproducibility (±1 digit)	Conductivity	≤ 0.1%, scale 100 mS ≤ 0.3%
	Temperature	≤ 0.1 °C
Thermal drift	Conductivity	≤ 15 ppm/°C, scale 100 mS ≤ 150 ppm/°C
	Temperature	≤ 15 ppm/°C
Signal output connector	MP5, 5-contact multipin. IP 67 protection	
Automatic switch-off	After 5 minutes, may be disabled by user	
Display	Liquid crystal with icons	
Keypad	membrane, 4 keys. Up to 6 million strokes per key guaranteed. Material: PET with protective treatment.	
Power supply	2 x 1.5V AA batteries, autonomy > 180 h.	
Electrical safety	UNE-EN 61010-1	
E.M.C. (ElectroMagnetic Compatibility)	As per CE, UNE- EN 61326	
Degree of protection	IP 65	
Ambient conditions	Operating temperature: -10...40°C. Storage: -15...65°C Relative humidity, not condensed, < 80%	
Enclosure	Casing material ABS	
Physical parameters	Weight 190 g. Size 160 x 74 x 50 mm.	

(*) The simulated values displayed are the real values. They are close to the values given on these pages.

The real simulated values appear on the instrument display screen.

Specifications subject to change without notice.



Conductivity cells

Conductivity cells.

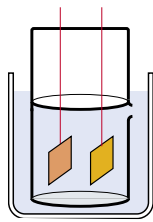
A little theory

There are various types of cell on the market:

- With two electrodes. This is the traditional system.
- With four electrodes. Used in dirty media with high conductivity levels.
- Induction. Used with very high conductivity and in highly-corrosive media.

The type of conductivity meter the user possesses will determine the type of cell he/she will use.

CRISON offers different models of two-electrode cell.



Two-electrode cell

With two metal electrodes. The cell is usually displayed as two 1 cm² metal plates with a 1 cm separation between them. This is equivalent to a 1 cm⁻¹ constant.

These days, the number, shape, material and size of the plates vary, but with a single aim: to improve measurement. i.e. the conductivity meter and the cell together display a wide-ranging scale of measurement with a high degree of precision.

Cells with temperature sensors

The CRISON cells shown in this catalogue have a built-in Pt 1000 temperature sensor, which means that conductivity and temperature can be measured simultaneously, thus allowing automatic correction of the effect that temperature will have on the conductivity of the sample.

Cell constant

Formerly, the cell constant was the parameter which characterised the cell. Depending on the constant, the scale of measurement of the cell would differ. Nowadays, the cell and the conductivity meter together set the scale of measurement.

As such, both the geometry of the cells and the electronic components of the instruments are optimised to cover the scale of measurement required.

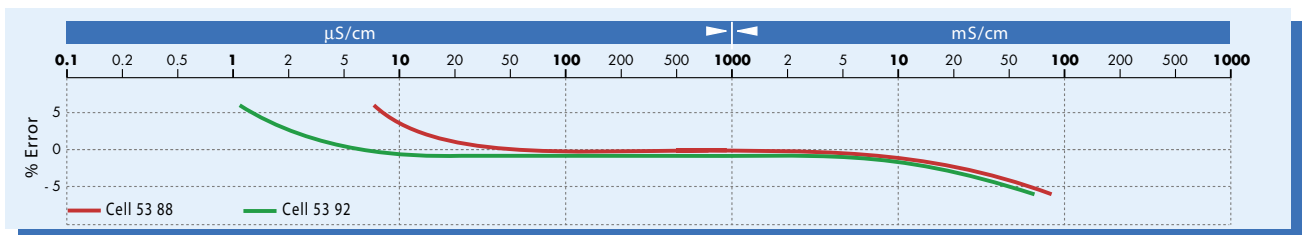
When the optimal scale of measurement of a cell is expressed, it always refers to a specific conductivity meter, so the behaviour of that same cell with other instruments cannot be guaranteed.

When it comes to choosing a cell, the user should select depending on:

- type of installation
- scale of measurement, always thinking with which conductivity meter it is to be used.

CRISON manufactures two models of cell, depending on the type of installation.

Response from cells 53 88 and 53 92 with CRISON conductivity meters CM 38 or CM 39.



Conductivity cells for reservoirs and tanks

53 88, titanium cell for reservoirs and tanks.

These are cells with a titanium and PVDF body and two titanium electrodes. They include a temperature sensor for automatic temperature compensation. They are very resistant to chemical attack by the aggressive products that waters may contain. Both their PG 13.5 thread and shape are compatible with pH and redox electrodes. This means that they can be used on a wide range of housings, including "multisensor" housings.

Advantages

Their sharp-pointed design prevents air bubbles forming and depositing on the surface of the electrodes.

They are easy to clean, both manually and automatically.

Long-lasting, under normal working conditions. Conductivity can be measured successfully in "dirty" media.

Applications, examples

Drinking water, municipal waters, water for irrigation, industrial waters, wastewater, etc.

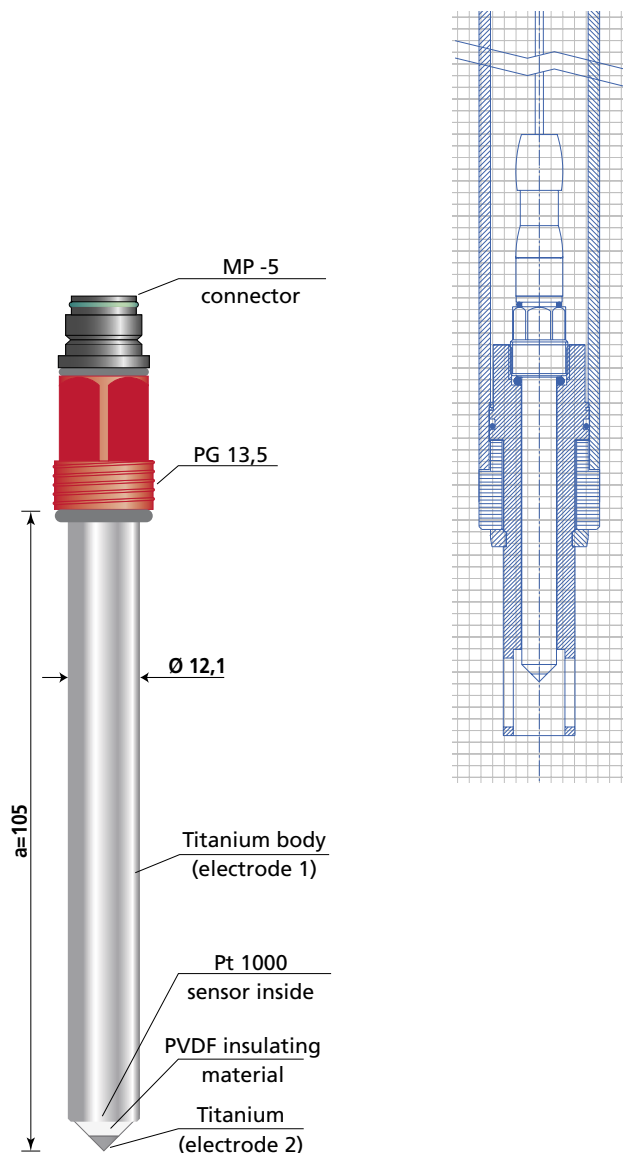
Mounting. See housings, pages 66...73

This cell should always be mounted in a housing. On an open reservoir or tank, they are mounted in immersion housings In 61, In 65 and In 68 or, if necessary, in flotation housings FL 60 and FI 69.

Cables

Connected to multiple cables with MP-5 connector. These cables are supplied in different lengths, with a 5-contact multipin (IP67) installed. The other end is connected to the internal terminal strips of the conductivity meter.

(See page 75)



53 88

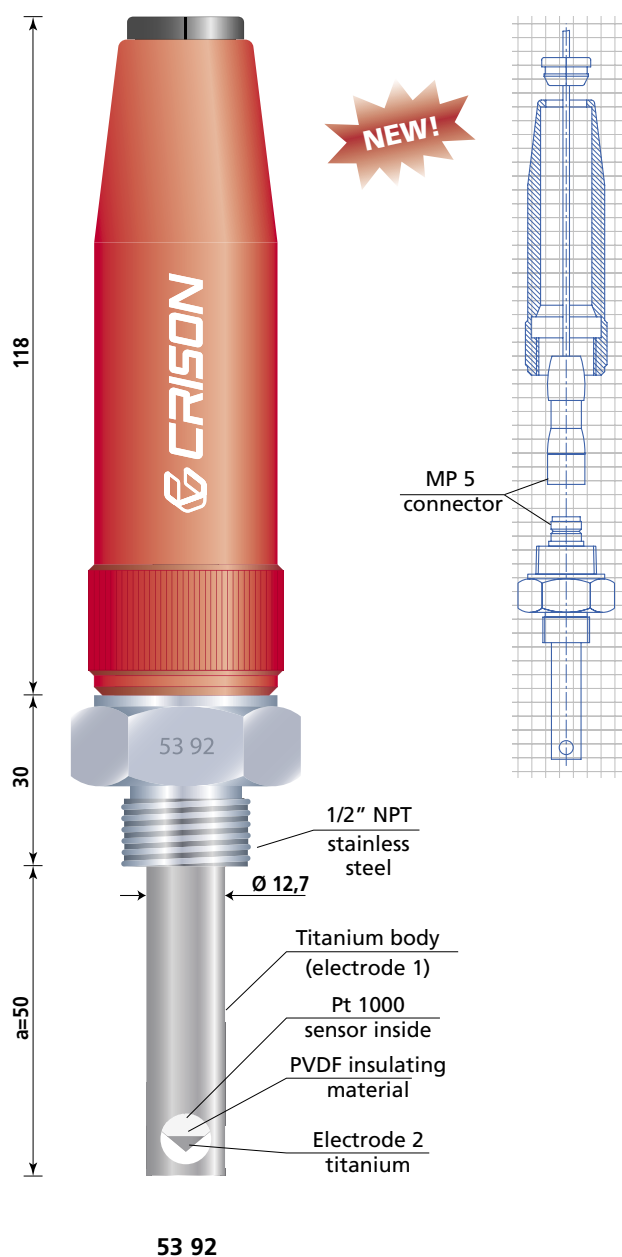
Specifications

Model	53 88
Body material	Titanium and PVDF
Measuring range	10...80.000 µS/cm
Operating temperature	0...80 °C
Temperature sensor	Pt 1000
Max. operating pressure	5 bar at 25°C
Installation	In housing
Thread	PG 13,5
Connector, protection	MP-5, IP 67

Conductivity cells for pipes or reactors

53 92, wide-scale conductivity cell.

This is a cell with two titanium electrodes, insulated with PVDF. This material ensures that this cell, used with CM 38 and 39 conductivity meters can cover a wide range of measurement, much wider than the classic stainless steel or graphite cells. The high level of chemical resistance of the titanium makes it practically indestructible. The thread is made of stainless steel. Each cell includes a temperature sensor for automatic temperature compensation. The cable connection is perfectly protected.



Advantages

All the advantages of their design. The materials are the most chemically-resistant possible. The shape of the measurement "chamber" makes it impossible for dirt to accumulate inside. Easy-to-clean, even using abrasive elements. The surface of the "electrodes" has no special treatment. The CRISON CM 38 and 39 conductivity meters include an electronic system which has been designed especially for measuring with these cells.

Applications, examples

Pure and clean waters.
Municipal, waste and industrial waters.
Drinking water, water for irrigation etc.

Mounting

Directly onto pipes or reactors.

Cables

They are connected using multiple cables with MP-5 connector. These cables are supplied in different lengths, with an IP65, 5-contact connector installed. The other end is connected to the internal terminal strips of the conductivity meters. (See page 75)

Specifications

Model	53 92
Body material	Titanium/PVDF/stainless steel
Measuring range	0.5...80.000 µS/cm
Operating temperature	0...100 °C
Temperature sensor	Pt 1000
Max. operating pressure	10 bar at 25 °C
Installation	Direct
Thread	1/2" NPT
Connector, protection	MP-5, IP 67

Standard conductivity solutions

NIST-traceable solutions.

In order to obtain correct conductivity measurements, the instrument and cell must be periodically calibrated together using contrasted standard solutions.

CRISON conductivity standards are NIST-traceable (National Institute of Standards & Technology). CRISON supplies three ready-to-use conductivity standard solutions with values of 147 $\mu\text{S}/\text{cm}$, 1413 $\mu\text{S}/\text{cm}$ and 12.88 mS/cm at 25 $^{\circ}\text{C}$.

Composition

147 $\mu\text{S}/\text{cm}$ standard: KCl 0.001 M

1413 $\mu\text{S}/\text{cm}$ standard: KCl 0.01 M

12.88 $\mu\text{S}/\text{cm}$ standard: KCl 0.1 M

Properties

Conductivity standard solutions are prepared in line with ASTM D1125-95.

They are contrasted with N.I.S.T. standard reference material (SRM).

Their tolerance is:

- 147 $\mu\text{S}/\text{cm}$ standard at 25 $^{\circ}\text{C}$: $\pm 5 \mu\text{S}/\text{cm}$
 - 1413 $\mu\text{S}/\text{cm}$ standard at 25 $^{\circ}\text{C}$: $\pm 12 \mu\text{S}/\text{cm}$
 - 12.88 mS/cm standard at 25 $^{\circ}\text{C}$: $\pm 0.11 \text{ mS}/\text{cm}$
- Shelf life: at least 2 years if stored correctly.

% at different temperatures			
$^{\circ}\text{C}$	$\mu\text{S}/\text{cm}$	$\mu\text{S}/\text{cm}$	mS/cm
15,0	119	1147	10,48
16,0	122	1173	10,72
17,0	125	1199	10,95
18,0	127	1225	11,19
19,0	130	1251	11,43
20,0	133	1278	11,67
21,0	136	1305	11,91
22,0	139	1332	12,15
23,0	142	1359	12,39
24,0	145	1386	12,64
25,0	147	1413	12,88
26,0	150	1440	13,13
27,0	153	1467	13,37
28,0	156	1494	13,62
29,0	159	1522	13,87
30,0	162	1549	14,12

Certificates of analysis

Each CRISON standard solution is supplied with a certificate of analysis indicating: (See page 60).

- uncertainty
- traceability
- composition
- batch number
- expiry date

Code	Description
97 00	Standard 147 $\mu\text{S}/\text{cm}$, 250 ml.
97 10	Standard 1413 $\mu\text{S}/\text{cm}$, 250 ml.
97 20	Standard 12.88 mS/cm , 250 ml.



Form for configuring a conductivity measurement system

On this page, we have placed the elements most frequently used in a measuring system.

To make it easier for you to place an order or request an up-to-date offer, please fax us a photocopy of this page.

This form can also be completed on our webpage: www.crison.es

Please tick ☒ the elements of interest to you.

Conductivity meter (page 42)

- ☐ 38 00 CM 38, field, 230 V A/C.
- ☐ 38 02 CM 38 P, panel, 230 V A/C.
- ☐ 39 00 CM 39, field, 230 V A/C.
- ☐ 39 02 CM 39 P, panel, 230 V A/C.

- ☐ 38 01 CM 38, field 24 V A/C.
- ☐ 38 03 CM 38 P, panel, 24 V A/C.
- ☐ 39 01 CM 39, field, 24 V A/C.
- ☐ 39 03 CM 39 P, panel, 24 V A/C.

Cell... (pages 51-52)

- ☐ 53 88 ...titanium, installation in reservoir.
- ☐ 53 92 ...titanium, installation in pipe.

"Single sensor" immersion housing (page 69)

- ☐ 61 01 In 61, in PVC. L = 800 mm
- ☐ 61 02 In 61, in PVDF. L = 800 mm
- ☐ 61 31 In 61, in PVC. L = 1600 mm
- ☐ 61 32 In 61, in PVDF. L = 1600 mm

- ☐ 63 01 In 63, self-cleaning, in PVC. L = 800 mm
- ☐ 63 02 In 63, self-cleaning, in PVDF. L = 800 mm
- ☐ 63 31 In 63, self-cleaning, in PVC. L = 1600 mm
- ☐ 63 32 In 63, self-cleaning, in PVDF. L = 1600 mm

"Multisensor" immersion housing (page 70)

- ☐ 68 01 In 68, self-cleaning, in PVC. L = 800 mm
- ☐ 68 31 In 68, self-cleaning, in PVC. L = 1600 mm

"Flotation" housing (page 71)

- ☐ 60 00 FL 60, in PVC.
- ☐ 69 01 FL 69, multisensor, in PVC.

Insertion housing (page 72)

- ☐ 76 01 In 76 in PVC.
- ☐ 77 01 In 77, in PVC.
- ☐ 77 02 In 77, in PVDF.
- ☐ 78 01 In 78, stainless steel.

Flow-through chamber (page 73)

- ☐ 60 03 CR 60 in PVC.

3-piece adapter (page 76)

- ☐ 61 08 DN 50, modified, in PVC.

Weld-in socket (page 76)

- ☐ 61 09 Straight in PVC.
- ☐ 61 12 Straight in PVDF.
- ☐ 61 14 Straight in PP.
- ☐ 61 21 Straight in stainless steel.

- ☐ 61 10 Inclined in PVC.
- ☐ 61 13 Inclined in PVDF.
- ☐ 61 15 Inclined in PP.
- ☐ 61 22 Inclined in stainless steel.

Cable (page 75)

- ☐ 90 44 Multiple connector MP-5, 3 m.
- ☐ 90 45 Multiple connector MP-5, 5 m.
- ☐ 90 46 Multiple connector MP-5, 10 m.
- ☐ 90 47 Multiple connector MP-5, 15 m.
- ☐ 92 51 Multiple connector MP-5, 20 m.

Solutions (page 53)

- ☐ 97 00 Standard 147 $\mu\text{S/cm}$, 250 ml.
- ☐ 97 10 Standard 1413 $\mu\text{S/cm}$, 250 ml.
- ☐ 97 20 Standard 12.88 mS/cm , 250 ml.

ISO calibration certificate (page 80)

- ☐ 89 31 For CM 38 or CM 38 P.

Other accessories

- ☐ 68 99 PG 13,5 screw-cap.

☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	

Price list

- ☐ Printed.
- ☐ Excel format.

Form for studying and defining a conductivity measurement system

If you require advice from our technicians when choosing the equipment required to monitor your process, please fill in this form and send it to us. We will contact you shortly with our proposal or offer.
This form can also be completed on our webpage: www.crison.es

Environment

Application

Measurement in	tank ☐	pipe ☐	pressurised reactor ☐
Material the tank or pipe is made of	PVC ☐	PVDF ☐	stainless steel ☐ other ☐
Pipe diameter	cm		
Ambient operating temperature	°C		
Relative humidity	%		

Process characteristics

Sample type			
Viscosity	cp		
Density	Kg/m³		
Temperature (°C)	min.	normal	max.
Pressure (bar)	min.	normal	max.
Conductivity	min.	normal	max.

Conductivity cell

Measuring range	from	to	µS/cm ☐ mS/cm ☐
Temperature range (°C)	from	to	
Pressure range (bar)	from	to	
Sterilisation	yes ☐	no ☐	

Cable

Length	M
Temperature resistance	°C

Housing

Housing type	immersion ☐	insertion ☐	flotation ☐	other ☐
Immersion length	800 mm ☐	1600 mm ☐	other ☐	
Material	PVC ☐	PVDF ☐	steel ☐	other ☐
With cleaning device	yes ☐	no ☐		

Transmitter

Mounting	panel ☐	field ☐	
Power supply	24V A/C ☐	230V A/C ☐	other ☐
Limit Relays	1 ☐	2 ☐	none ☐
Control	no ☐	on/off ☐	
Sensor cleaning relay	yes ☐	no ☐	
Alarm relay	yes ☐	no ☐	



Oxygen meters



Continuous measurement of dissolved oxygen (D.O.)

Continuous D.O. measurement plays an important role in several areas of aquifer resource and wastewater management. D.O. is essential to maintain life.

In natural waters

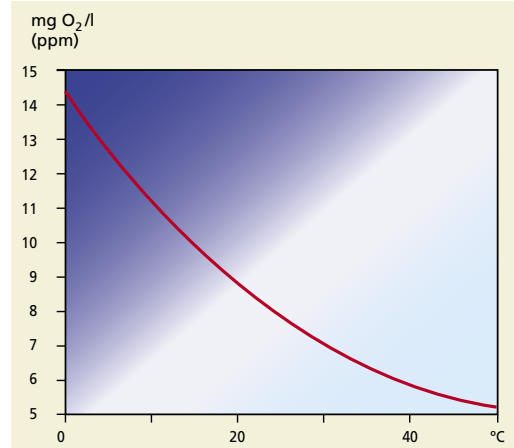
The level of oxygen in natural waters is normally an indicator of quality. Everything from plants to micro-organisms, consumes O_2 . The solubility of O_2 increases at low temperatures, so in winter we can find concentrations of up to 20 ppm in natural waters, whereas in summer the levels tend to be between 4 and 5 ppm. D.O. is essential for all types of aquatic life and helps in the decomposition of organic matter.

In wastewater

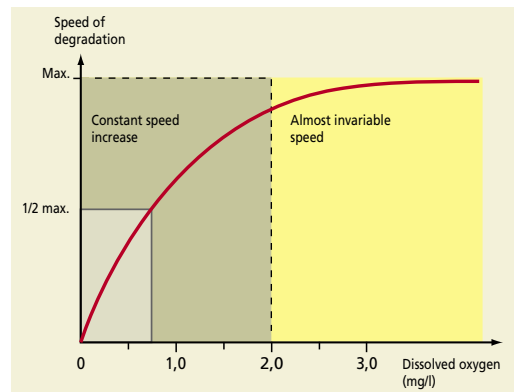
Where water is to be biologically purified, continuous and accurate determination of the level of dissolved oxygen has become a basic requirement for water treatment plants. The efficacy of biological purification, both during nitrification and de-nitrification, is affected by the quality with which aeration is regulated, i.e. how D.O. is regulated. The economic factor is especially important, given the high energy costs involved in aerating water. Correct measurement helps optimise costs in this area.

In closed circuits

At high temperatures, oxygen is highly corrosive to metal, causing the formation of rust in systems such as e.g. high-pressure boilers. To avoid the cost of damage by corrosion, the liquids in contact with metallic surfaces need to be treated, normally using a combination of physical and chemical methods. De-aeration reduces the concentration of D.O. in boiler waters from some ppm to very few ppb. It is, then, very important to monitor the concentration of D.O. to help detect quickly any undesirable contamination of these waters, e.g. caused by leaks from the pumps or any part of the cooling circuit, etc.



Solubility of oxygen in water, depending on temperature



Degradation of NH_4-N_2 and its dependence on the concentration of oxygen

Our instruments for measuring D.O. cover the entire range of concentration from 0.1 mg/l.

Field and panel oxygen meters

The OXI 49, both field and panel versions, are instruments that can be used for a large number of applications, e.g. analysis and treatment of waters in general, wastewater, fish-farming, etc. Apart from being easy to install and connect, they are also easy to programme and calibrate. Two, extremely safe instruments with the same characteristics. The only difference is the casing, which differs in accordance with the requirements for location: in the field or on a panel.

Main features

This is a specific instrument for measuring and controlling D.O. and temperature in continuous processes.

Both parameters are displayed simultaneously on-screen.

The display is backlit, which aids reading in dark places.

Measurement can be expressed in %, mg/l or ppm.

Manual data entry for pressure and salinity for automatic correction of the measurement.

One point air-calibration.

A security code prevents unauthorised personnel from interrupting measurement processes. Only authorised personnel can calibrate and program the equipment.

During calibration and programming, the instrument remains on hold.

Three digital signals: a limit relay, one to activate sensor cleaning automatically and one for the alarm.

The limit, cleaning and alarm relays can be activated manually.

This is very useful for checking instrument installation and manoeuvre.

An analogue signal, galvanically insulated, for process automation and monitoring. A **Data logger**, which keeps a record of the last 200 measurements taken.

During calibration, the current read by the electrode, nA, is displayed on-screen. This gives an indication of its condition.

The field version has a watertight transparent cover to protect the keypad and display.

The OXI 49P (96 x 96) is a very compact version, specifically designed for mounting on standardised panels.

Certificates

Both models are supplied with the EC Declaration of Conformity as per EMC directives 73/23/EC on low-voltage devices and 89/336/EC, and with specifications certificate.

(More information about certificates on page 79)



OXI 49



OXI 49 P

Display examples

During start-up

...select language

```
IDIOMA >Español
          Italiano
```

```
Français
English
```

...and the instrument goes to:

```
MEASURING D.O.
3.21 mg/l 19.7 °C
```

During calibration

...enter the access code

```
CODE 000
```

...and follow the instructions

```
>CALIBRATION<
100% 65.6 nA
```

Other messages

..."out of limit" measurement message

```
>L< MEASURING D.O.
8.75 mg/l 22.3 °C
```

..."alarm" warning

```
>ALARM<
8.75 mg/l 22.3 °C
```

...sensor "cleaning" warning.

```
CLEANING SENSOR
3 s
```

...etc.

Keypad

The whole range of functions can be accessed using only four keys and the "intelligent" display.



Technical specifications.

Measuring range	Saturation	0.0...200.0 % O ₂ saturation
	Concentration	0.00...20.00 mg/l (ppm)
	Temperature	0...50 °C
Resolution	Saturation	0.1 %
	Concentration	0.01 mg/l (ppm)
	Temperature	0.1 °C
Measurement error (± 1 digit)	D.O.	≤ 1%, full range
	Temperature	≤ 0.3 °C
Temperature compensation		Automatic with NTC 22K sensor built into electrode
Calibration		1 point, in air, 100% saturation. With information on the current measured.
Salinity correction		Automatic, with manual data-entry. 0.0...50.0 g/l
Pressure correction		Automatic, with manual data-entry
Analogue output galvanically insulated (max. R = 500Ω)		4...20 mA for measurement 21 mA for instrument on hold 22 mA as alarm signal
Control mode		On/Off
Relays, delayed activation potential-free Maximum load CA<250V, <3A, <750VA		1 for limit. N/O Contact 1 for alarm. N/C Contact 1 for cleaning. N/O Contact
Verify installation		Relay activation Output 4-20 mA
Data logger		Storage of up to 200 data entries in memory
Languages		Spanish, Italian, English and French
Display		LCD, alphanumeric, backlit. 2 lines of 16 characters
Cable length		≤ 20 metres
Polarisation voltage		- 675 mV ± 3 %
Power supply		230 or 24 V A/C, 45...65 Hz (115 V A/C special order) Protection class II. Surge category II
Electrical safety		EN 61010-1-compliant
E.M.C. (ElectroMagnetic Compatibility)		EN 50081-1 EN 50081-2 and EN 50082-1 EN 50082-2 -compliant
Ambient Conditions		Operating temperature: -20...55 °C. Storage and transport: -20...70 °C Relative humidity, not condensed, < 80%., Max. altitude 2,000 m for 220 V, 3,000 m for 24 V
Enclosure	OXI 49:	Thermoplastic material, IP 55 protection.
	OXI 49 P:	PPE, ether polyphenylene, IP 54 protection.
Physical parameters	OXI 49:	Weight 700 g. Size 105 x 170 x 100
	OXI 49 P:	Weight 600 g. Size 96 x 96 x 100

Specifications subject to change without notice

Code	Description
49 00	OXI 49 field oxygen meter, 230 V A/C
49 01	OXI 49 field oxygen meter, 24 V A/C
49 02	OXI 49P panel oxygen meter, 230 V A/C
49 03	OXI 49P panel oxygen meter, 24 V A/C

N.B.: See page 64 to configure a complete system

Diagram of a D.O. measurement system using the OXI 49 or 49 P

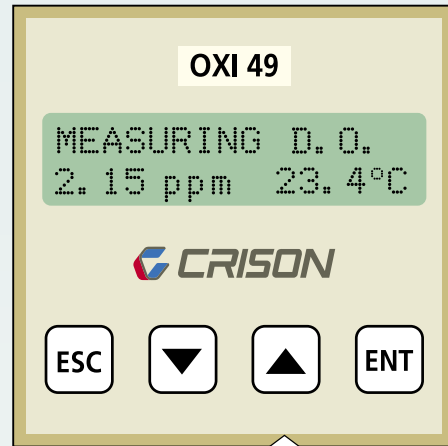
Model to choose...

... for accurate and reliable measurements at the best possible cost for purchase and maintenance.

... if the user wishes to clean the sensor automatically.

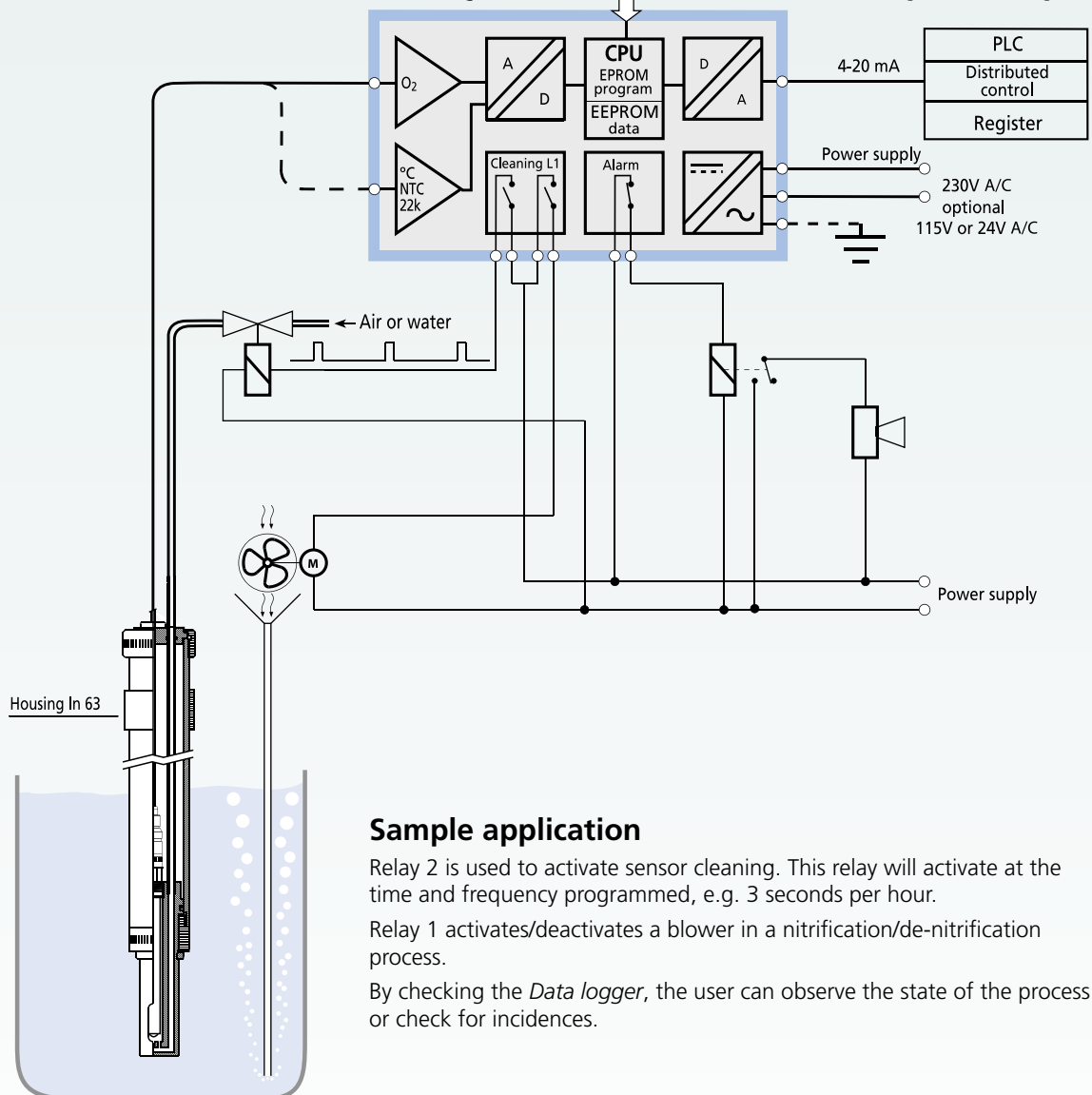
... when an alarm relay is required.

... to be able to check what happened during the process using the *Data logger* and comply according to the GMP (Good Manufacturing Practice).



Block diagram

Signal receiving device



Sample application

Relay 2 is used to activate sensor cleaning. This relay will activate at the time and frequency programmed, e.g. 3 seconds per hour.

Relay 1 activates/deactivates a blower in a nitrification/de-nitrification process.

By checking the *Data logger*, the user can observe the state of the process or check for incidences.



D.O. electrode

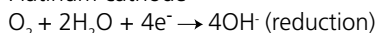
Dissolved Oxygen (D.O.) electrodes.

A little theory

Dr. Clark's invention of the membrane electrode for D.O. reading (patented in 1959) was a giant step forward because it did away with the slow, laborious methods used up until then for D.O. reading. Ever since then, new O₂ electrode patents have been filed, all based on Clark's model.

The system consists of a two-electrode cell, an oxygen-permeable membrane and an electrolyte. The anode electrode is made of silver and the cathode is made of a noble metal, usually platinum. An electrolyte, containing KCl, should join the anode and the cathode. The oxygen diffuses through the permeable membrane towards the inside of the electrode, where the following reactions occur:

Platinum cathode



Silver anode



These reactions generate a current, which is the basis for the measurement.

There are two types of sensor:

- Polarographic sensor, to which voltage must be applied in order to take the measurement.
- Galvanic sensor, the cell itself generates sufficient voltage as to take the measurement.

Advantages of polarographic sensors over galvanic sensors.

- Possibility of selecting optimal polarisation voltage, thus preventing possible interferences, e.g. those caused by CO₂.
- Contamination of the anode is prevented while the sensor is not working.
- They require a smaller flow of sample to obtain stable readings.
- They can work for long periods of time, due to the small size of the cathode, with minimal variations to readings (low noise levels).
- The faster response of the polarographic electrode means that thicker, and thus stronger and longer-lasting membranes can be used.

Polarographic sensors are only active, by definition, when they are polarised. These sensors are long-lasting and highly-stable over time.

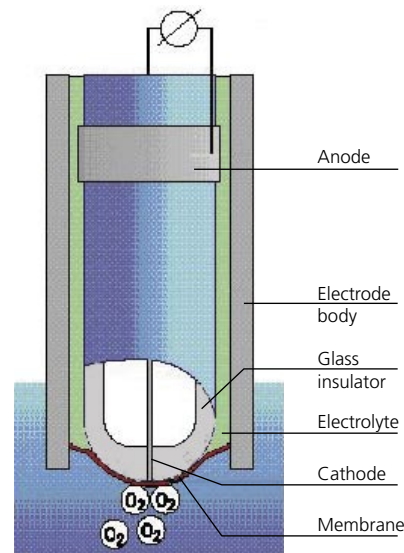
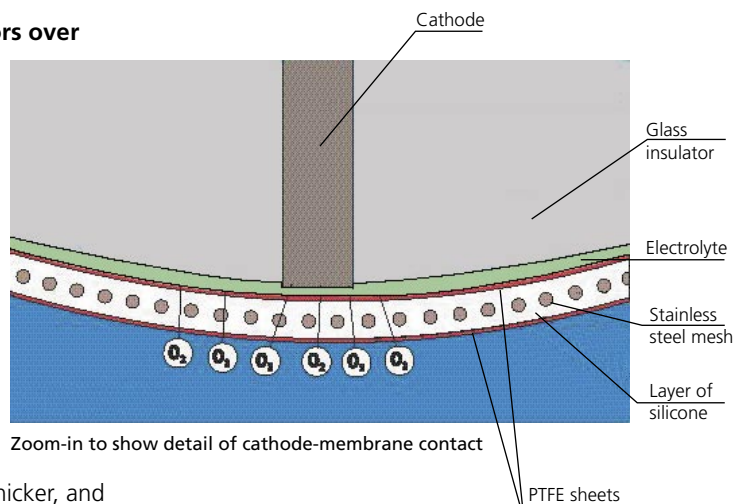


Diagram of the D.O. electrode



D.O. electrode

60 50 D.O. Electrode

The 6050 electrode is a polarographic sensor which measures D.O. and temperature simultaneously in water.

It has a plastic body, a VP connector, is IP 68 watertight to ensure that the cable-electrode connection is protected even under the most adverse industrial conditions, with the advantage that maintenance and replacement of the electrode are simpler and more economical than with fixed-cable electrodes.

It uses mechanical and chemical-resistant membranes. When they wear out, they are quick to replace.

Overall, the 6050 is a top-quality electrode at a very competitive price.

An exceptional membrane

The membrane consists of:

- A fine stainless steel mesh which acts as a firm support.
- A layer of silicone which gently impregnates and covers the stainless steel mesh on both sides.
- Two sheets of PTFE, one on each side of the silicone, which make it more physically-resistant and make it difficult for micro-organisms and dirt to stick to the surface.

(See diagram on page 62)

Temperature sensor

Housed inside the electrode.

Applications, examples

Drinking water, cooling circuit, preparation of industrial waters, wastewater treatment, boiler waters.

Mounting. See housings, pages 66...73

They have an identical format to pH and redox electrodes, and to certain conductivity cells, and as such are compatible with standard housings.

Cables

They are connected using multiple cables with VP connector.

These cables are supplied in different lengths, with a VP connector (IP68) installed. The other end is connected to the oxygen meter terminal strips.

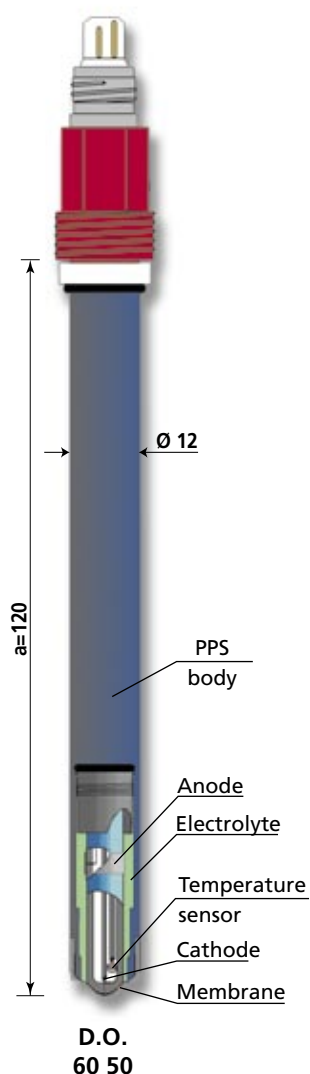
(See page 75)

Spare parts

Code	Description
60 48	60 50 electrode replacement membrane
98 10	60 50 electrode electrolyte

Specifications

Model	60 50
Measuring range	0.3% to saturation 0.03 ppm to saturation
Operating temperature	0...50 °C
Max. operating pressure	2 bar
Temperature sensor	NTC / 22 K
Thread	PG 13,5
Connector, protection	VP, IP 68
Body material	PPS plastic
Membrane material	PTFE-coated silicone



Form for configuring a D.O. measurement system

On this page, we have placed the elements most frequently used in a measuring system.
To make it easier for you to place an order or request an up-to-date offer, please fax us a photocopy of this page.
This form can also be completed on our webpage: www.crison.es
Please tick ☒ the elements of interest to you.

Oxygen meter (page 58)

- ☐ 49 00 OXI 49, field, 230 V A/C.
- ☐ 49 01 OXI 49, field, 24 V A/C.
- ☐ 49 02 OXI 49 P, panel, 230 V A/C.
- ☐ 49 03 OXI 49 P, panel, 24 V A/C.

Electrode (page 63)

- ☐ 60 50 D.O. Electrode
- ☐ 60 48 D.O. Electrode replacement membrane
- ☐ 98 10 D.O. Electrolyte replacement

"Single sensor" immersion housing (page 69)

- ☐ 61 01 In 61, in PVC. L = 800 mm
- ☐ 61 02 In 61, in PVDF. L = 800 mm
- ☐ 61 31 In 61, in PVC. L = 1600 mm
- ☐ 61 32 In 61, in PVDF. L = 1600 mm
- ☐ 63 01 In 63, self-cleaning, in PVC. L = 800 mm
- ☐ 63 02 In 63, self-cleaning, in PVDF. L = 800 mm
- ☐ 63 31 In 63, self-cleaning, in PVC. L = 1600 mm
- ☐ 63 32 In 63, self-cleaning, in PVDF. L = 1600 mm

"Multisensor" immersion housing (page 70)

- ☐ 68 01 In 68, self-cleaning, in PVC. L = 800 mm
- ☐ 68 31 In 68, self-cleaning, in PVC. L = 1600 mm

"Flotation" housing (page 71)

- ☐ 60 00 FL 60, in PVC.
- ☐ 69 01 FL 69, multisensor, in PVC.

Insertion housing (page 72)

- ☐ 76 01 In 76 in PVC.
- ☐ 77 01 In 77, in PVC.
- ☐ 77 02 In 77, in PVDF.
- ☐ 78 01 In 78, stainless steel

Flow-through chamber (page 73)

- ☐ 60 03 CR 60 in PVC.

3-piece adapter (page 76)

- ☐ 61 08 DN 50, modified, in PVC.

Weld-in socket (page 76)

- ☐ 61 09 Straight in PVC.
- ☐ 61 12 Straight in PVDF.
- ☐ 61 14 Straight in PP.
- ☐ 61 21 Straight in stainless steel.
- ☐ 61 10 Inclined in PVC.
- ☐ 61 13 Inclined in PVDF.
- ☐ 61 15 Inclined in PP.
- ☐ 61 22 Inclined in stainless steel.

Cable (page 75)

- ☐ 11 03 Multiple with VP connector, 3 m.
- ☐ 11 05 Multiple with VP connector, 5 m.
- ☐ 11 10 Multiple with VP connector, 10 m.
- ☐ 11 15 Multiple with VP connector, 15 m.

Other accessories

- ☐ 68 99 PG 13,5 screw-cap
- ☐
- ☐
- ☐
- ☐
- ☐
- ☐

Price list

- ☐ Printed
- ☐ Excel format

Form for studying and defining a D.O. measurement system

If you require advice from our technicians when choosing the equipment required to monitor your process, please fill in this form and send it to us. We will contact you shortly with our proposal or offer.

This form can also be completed on our webpage: www.crison.es

Environment

Application

Measurement in tank ☐ pipe ☐ pressurised reactor ☐

Material the tank or pipe is made of PVC ☐ PVDF ☐ steel ☐ other ☐

Pipe diameter cm

Ambient operating temperature °C

Relative humidity %

Process characteristics

Sample type

Viscosity cp

Density Kg/m³

Temperature (°C) min. normal max.

Pressure (bar) min. normal max.

Sensor, D.O. electrode

Measuring range from to % ☐ mg/l ☐

Temperature range (°C) from to

Pressure range (bar) from to

Sterilisation yes ☐ no ☐

Cable

Length m

Temperature resistance °C

Housing

Housing type immersion ☐ insertion ☐ flotation ☐ other ☐

Immersion length 800 mm ☐ 1600 mm ☐ other ☐

Material PVC ☐ PVDF ☐ steel ☐ other ☐

With cleaning device yes ☐ no ☐

Transmitter

Mounting panel ☐ field ☐

Power supply 24 V A/C ☐ 230 V A/C ☐ other ☐

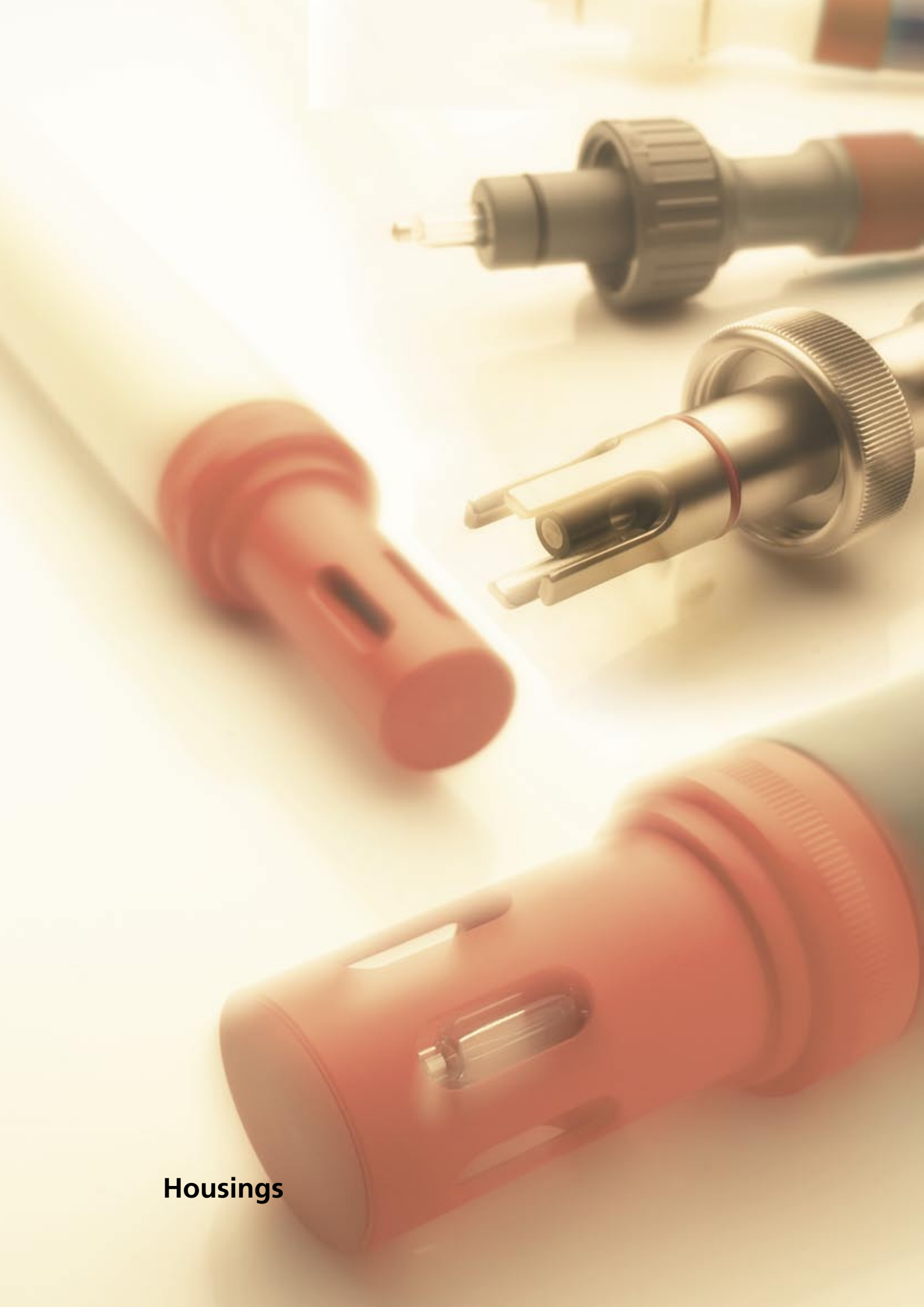
Limit Relays 1 ☐ 2 ☐ none ☐

Control no ☐ on/off ☐

Sensor cleaning relay yes ☐ no ☐

Alarm relay yes ☐ no ☐

D.O.



Housings

CRISON Housings.

Protection for sensors.

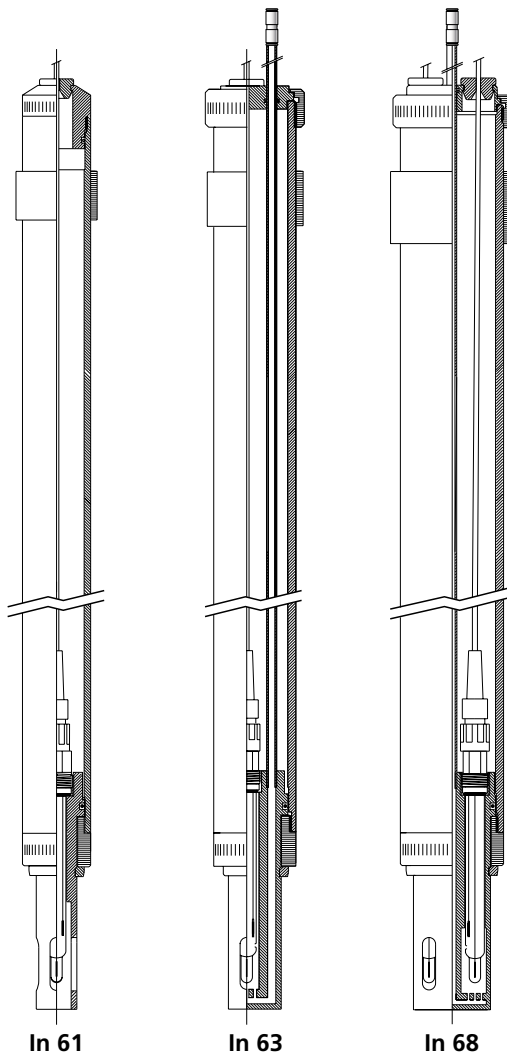
General overview

Introduction

For correct installation of a pH or redox, conductivity or D.O. sensor in a process, a housing must be used. It is designed to:

- Protect the electrode against mechanical impacts.
- Prevent splashing, "flooding" and chemical attack on electrode and cable connectors.
- Ensure that the sensitive part of the electrode is immersed.
- Increase measurement safety.
- Extend electrode life.
- Facilitate sensor maintenance.

CRISON offers a wide range of housings:



In 61

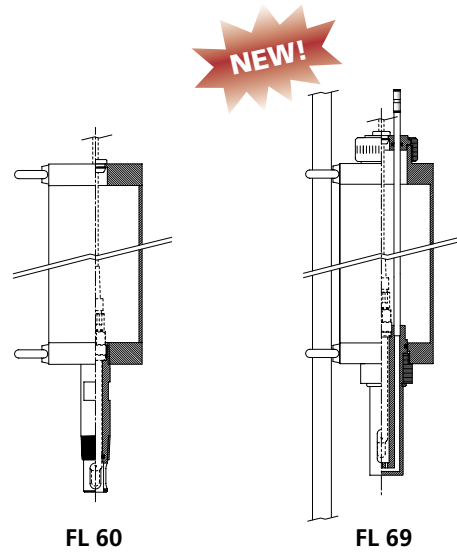
In 63

In 68

Immersion housings

These are mounted vertically in reservoirs and tanks. Simple models, for a single sensor, and multiple models for up to three sensors.

We also have models with a device for cleaning the sensors automatically.

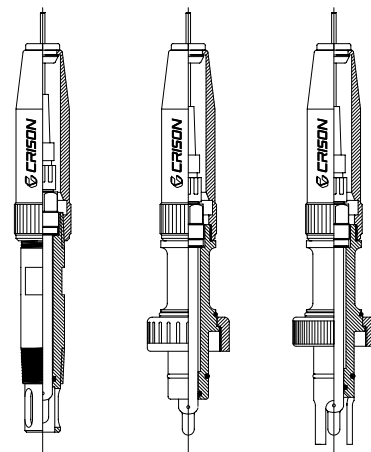


FL 60

FL 69

"Flotation" housings

For installing in reservoirs, when the level of the liquid to be measured may vary. A model with a device for cleaning the sensor.



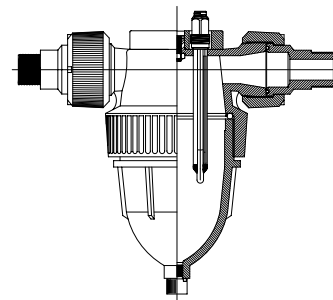
In 76

In 77

In 78

Insertion housings

To install sensors in pipes or side-mounted on tanks. CRISON manufactures three models, made of different materials.

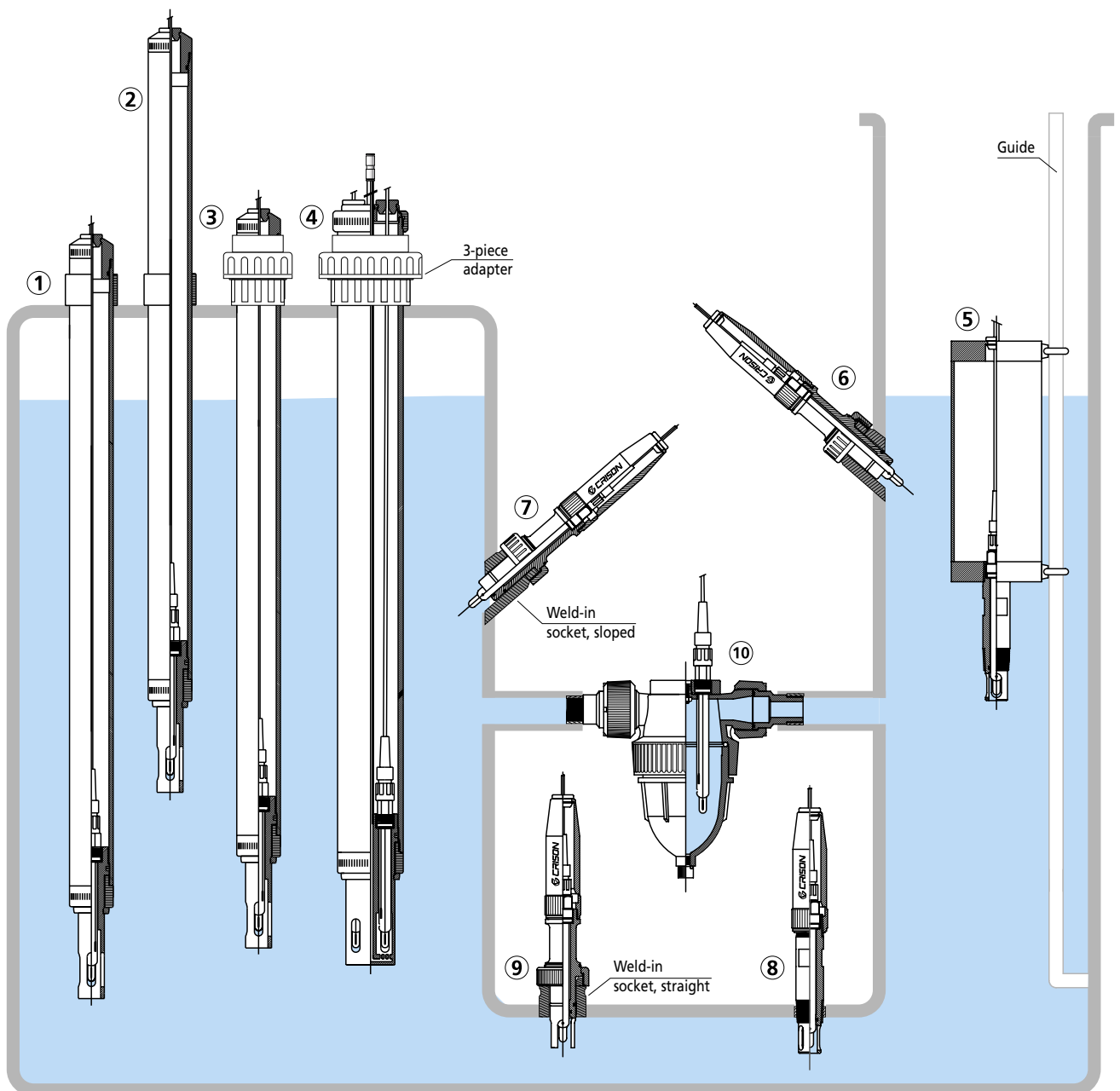


CR 60

Flow-through chamber

For installing in pipes where sensors cannot be mounted directly.

Examples of housing installations



"Immersion" housings

1. In 61 housing, rests on the cover of a tank. Maximum immersion.
2. In 61 housing, minor immersion. The height can be modified by moving the outside ring.
3. In 61 housing. Attached using a 3-piece adapter, DN 50.
4. In 68, multiple housing. Attached using a 3-piece adapter, DN 75.

"Flotation" housings

5. FL 60 housing, mounted on stainless steel guide-rail, fixed to the wall of the tank.

"Insertion" housings

6. In 77 housing, side-mounted on pipe using inclined DN 25 weld-in socket.
7. In 77 housing, side-mounted on tank using inclined DN 25 weld-in socket.
8. In 76 housing, screws directly onto pipe, $\frac{3}{4}$ " NPT thread.
9. In 78 housing, mounted vertically using straight DN 25 weld-in socket.

Flow-through chamber

10. CR 60 Flow-through chamber.

"Single sensor" immersion housings

In 61 housing

These housings are specific for mounting on reservoirs or tanks.

They are designed to receive pH and redox electrodes, conductivity cells, D.O. electrodes, temperature compensators, etc. with PG 13.5 thread. As a result, they are compatible with similar-format sensors, both CRISON and other manufacturers'.

Manufactured in two types of material: PVC and PVDF. The latter supports temperatures of up to 110°C.

In 63 Housing

Designed to be able to clean the sensor automatically with a pressurised jet of air, water or other liquid, aimed directly at its sensitive part.

Deposits forming on the electrode is one of the most frequent causes of problems when measuring pH/ORP. These deposits are caused by continual exposure of the sensor to a dirty or contaminated medium. Periodic cleaning is absolutely necessary to prevent formation of undesirable coatings on the sensor and thus ensure that the system works correctly.

Manufactured in two types of material: PVC and PVDF.

Compatible sensors

Sensors with PG 13.5 thread.

Installation

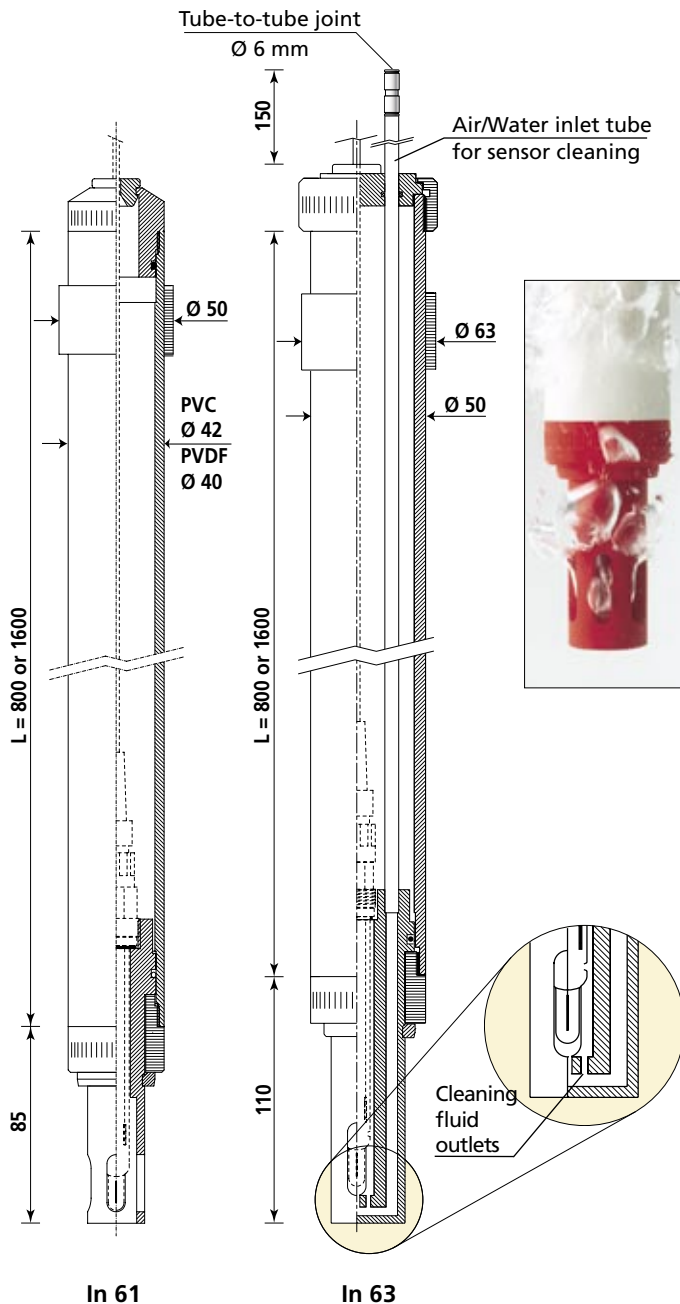
They can be mounted either resting on a brace, held in place by gravity, or on the perforated cover of a tank.

Also attaching them using a 3-piece adapter:

- DN 50 modified for In 61

- DN 63 for In 63

(See page 77)



Detail of escaping air bubbles during sensor cleaning

Specifications

Model	In 61		In 63	
Sensor cleaning	--		✓	
Material	PVC	PVDF	PVC	PVDF
Operating temp.	0...60 °C	0...110 °C	0...60 °C	0...110 °C
Operating pressure	Atmospheric			
Cleaning pressure	--		Max. 1,5 bar	
O-rings	Nytrile	Viton	Nytrile	Viton
Compatible sensors	With PG 13.5 thread			
Number of sensors	1			

Code	Description
61 01	In 61 housing, in PVC, L=800.
61 02	In 61 housing, in PVDF, L=800.
61 31	In 61 housing, in PVC, L=1600.
61 32	In 61 housing, in PVDF, L=1600.
63 01	In 63 housing, in PVC, L=800.
63 02	In 63 housing, in PVDF, L=800.
63 31	In 63 housing, in PVC, L=1600.
63 32	In 63 housing, in PVDF, L=1600.

N.B.: Housings are supplied without sensors.

"Multisensor" immersion housings

In 68 Housing

Capable of housing three sensors and control several different parameters at a single point.

Designed to be able to clean sensors automatically with a pressurised jet of air, water or other liquid, aimed directly at the sensitive part of the sensors.

Deposits forming on the electrodes is one of the most frequent causes of problems when measuring pH/ORP. These deposits are caused by continual exposure of the sensors to a dirty or contaminated medium. Periodic cleaning prevents formation of undesirable coatings on the sensors and thus ensure that the system works correctly.

Compatible sensors

Sensors with PG 13.5 thread.

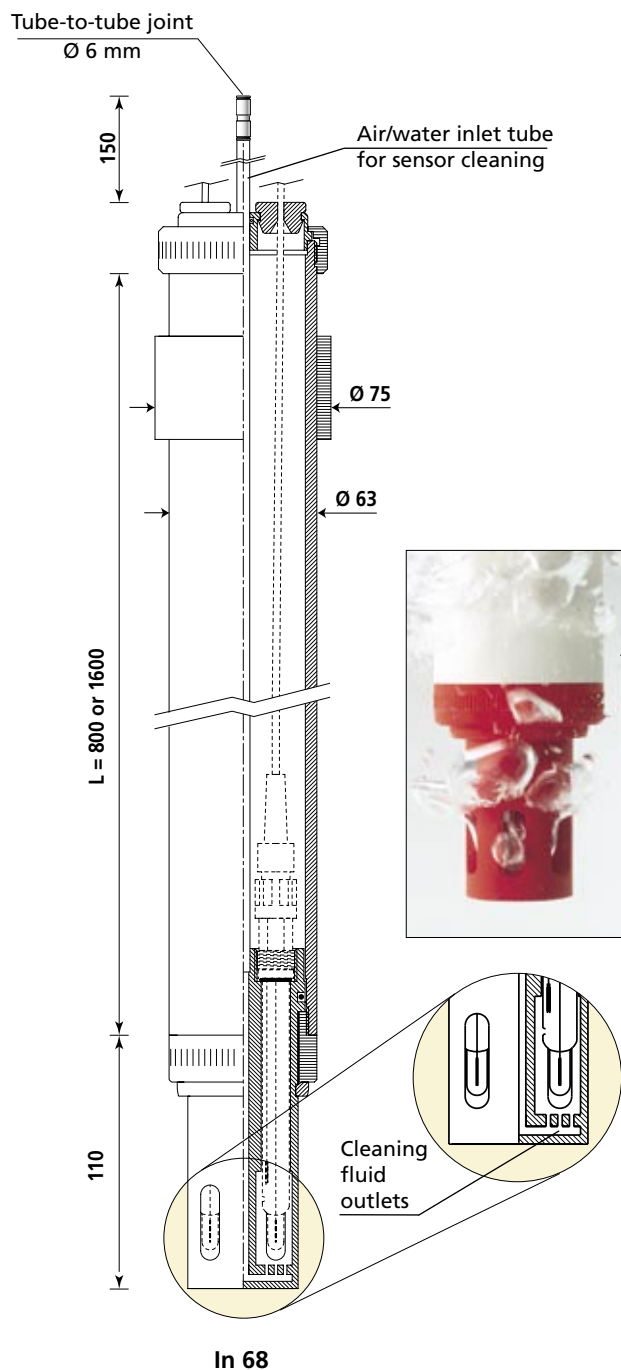
Installation

Can be mounted either resting on a brace, held in place by gravity, or on the perforated cover of a tank. Can also be attached using a DN 75 3-piece adapter. (See pages 68 and 76)

Important

When a "multisensor" housing is used to install less than three sensors, the holes without a sensor must be covered, to prevent the housing from being flooded.

(See PG 13.5 screw-cap, page 76)



Detail of escaping air bubbles during sensor cleaning.

Specifications

Model	In 68
Sensor cleaning	✓
Material	PVC
Operating temperature	0...60 °C
Operating pressure	Atmospheric
Wash pressure	Máx. 1,5 bar
O-rings	Nytrile
Compatible sensors	With PG 13.5 thread
Number of sensors	1, 2 or 3

Code	Description
68 01	In 68, multisensor housing, in PVC, L=800
68 31	In 68 multisensor housing, in PVC, L=1600.

N.B.: Housings are supplied without sensors.

"Flotation" housings

FL 60 Housing

Especially recommended for installation where the level of the liquid to be measured may vary. Very useful for installing pH, redox sensors, etc.

FL 69 Housing

Designed to be able to clean sensors automatically with a jet of air, water or other liquid, aimed directly at the sensitive part of the sensors. This prevents formation of undesirable coatings on the sensor and thus ensure that the system works correctly.

Compatible sensors

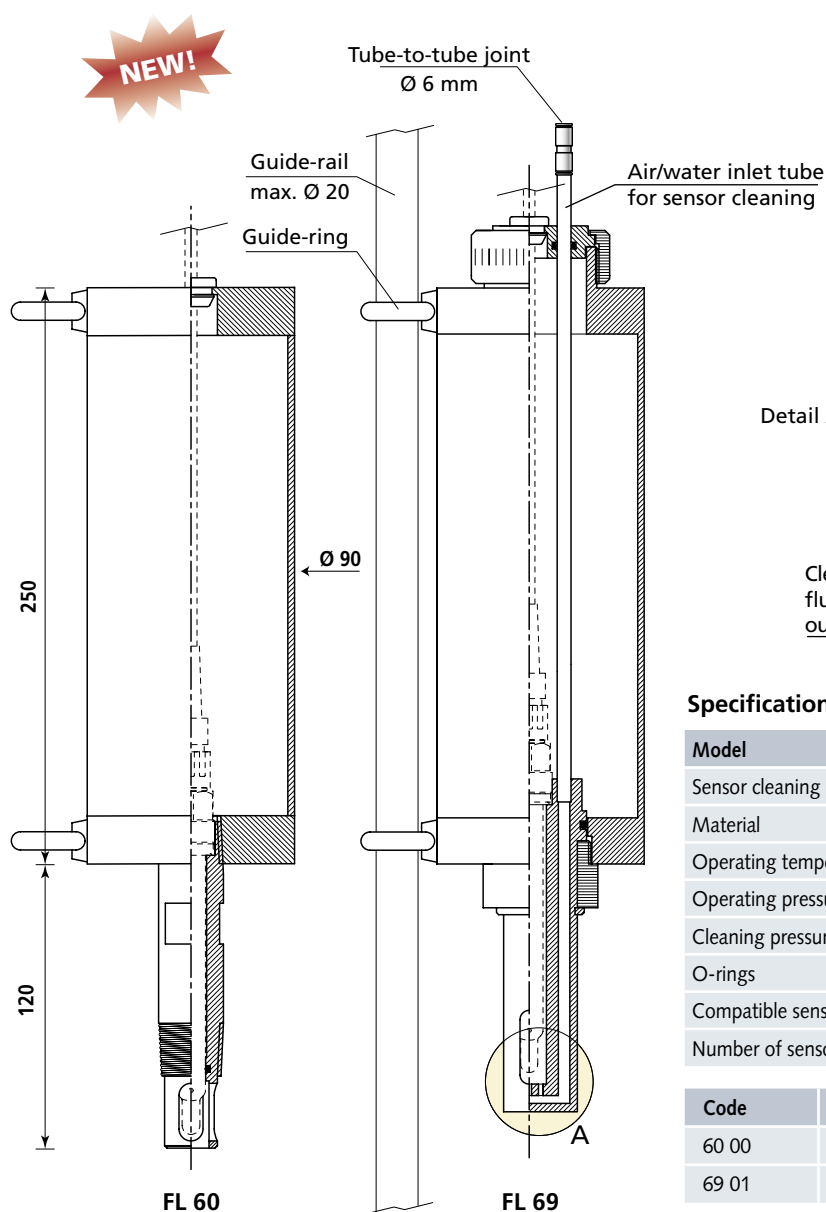
Sensors with PG 13.5 thread.

Installation

These are installed by fixing a stainless steel guide-rail, with a maximum diameter of 20 mm, on the wall of the reservoir, tank or reactor. See page 68

This ensures that the electrode is always in contact with the sample, whatever the level of the product to be measured.

On the FL 69 housing, connection to the cleaning section is made via a tube-to-tube joint Ø 6 mm (external).



Detail of escaping air bubbles during sensor cleaning

Specifications

Model	FL 60	FL 69
Sensor cleaning	--	✓
Material	PVC	
Operating temperature	0...60 °C	
Operating pressure	Atmospheric	
Cleaning pressure	--	Max. 1,5 bar
O-rings	Nitrile	
Compatible sensors	With PG 13.5 thread	
Number of sensors	1	

Code	Description
60 00	FL 60 housing, in PVC
69 01	FL 69 housing, in PVC.

N.B.: Housings are supplied without sensors.

Insertion housings for pipes or tanks

In 76 Housing

This is an adaptor to convert the electrode's PG 13.5 thread to $\frac{3}{4}$ " NPT, the latter being standard in pipeline industry. It also offers excellent protection for the glass part of the sensor.

Very economical!

Calibration and cleaning are fairly laborious. First the electrode cable must be unscrewed, then the part which protects the electrode, with the electrode still inside.

In 77 and In 78 Housings

These housings overcome the limitations of the In 76. During calibration and maintenance, the user need only unscrew and screw the knurled bolt on the housing to extract the housing and sensor, without handling the cable connector at all.

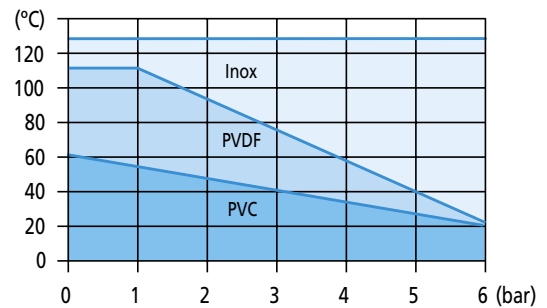
The housings are installed by connecting them to DN 25 3-piece adapters.

Compatible sensors

Sensors with PG 13.5 thread.

Operating pressure

The pressure that the housings can support will depend on the material and the temperature to which they are subjected.



Pressure/Operating temperature graph

Installation

The In 76 housing screws directly onto pipes as a result of its $\frac{3}{4}$ " NPT thread.

The In 77 and In 78 are mounted on DN 25 3-piece adapters.

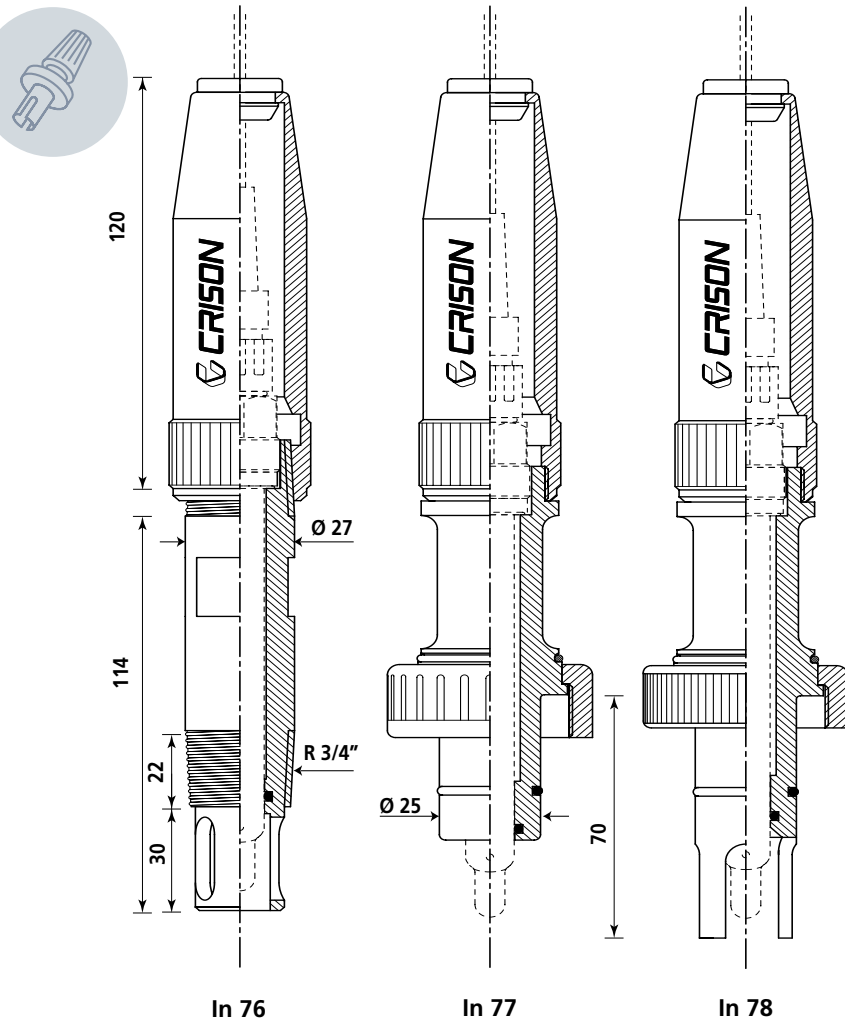
(See page 77)

Specifications

Model	In 76	In 77	In 78
Material	PVC	PVC	PVDF
Operating temp.	0...60 °C	0...60 °C	0...110 °C
Operating press.	Depending on temperature (see graph)		
O-rings	Viton		
Compatible sensors	With PG 13.5 thread		
Number of sensors	1		
Installation	R 3/4"	DN-25 3-piece adapter	

Code	Description
76 01	In 76 housing in PVC.
77 01	In 77 housing in PVC.
77 02	In 77 housing, in PVDF.
78 01	In 78 housing in stainless steel.

N.B.: Housings are supplied without sensors.



Flow-through chamber for single or multiple sensors

CR 60 trough

The CR 60 flow-through chamber is designed to receive up to 3 sensors. It is used for measuring in small-diameter tubes.

The bottom section is like a transparent beaker which can be taken apart easily to perform maintenance work: sensor calibration and cleaning.

Compatible sensors

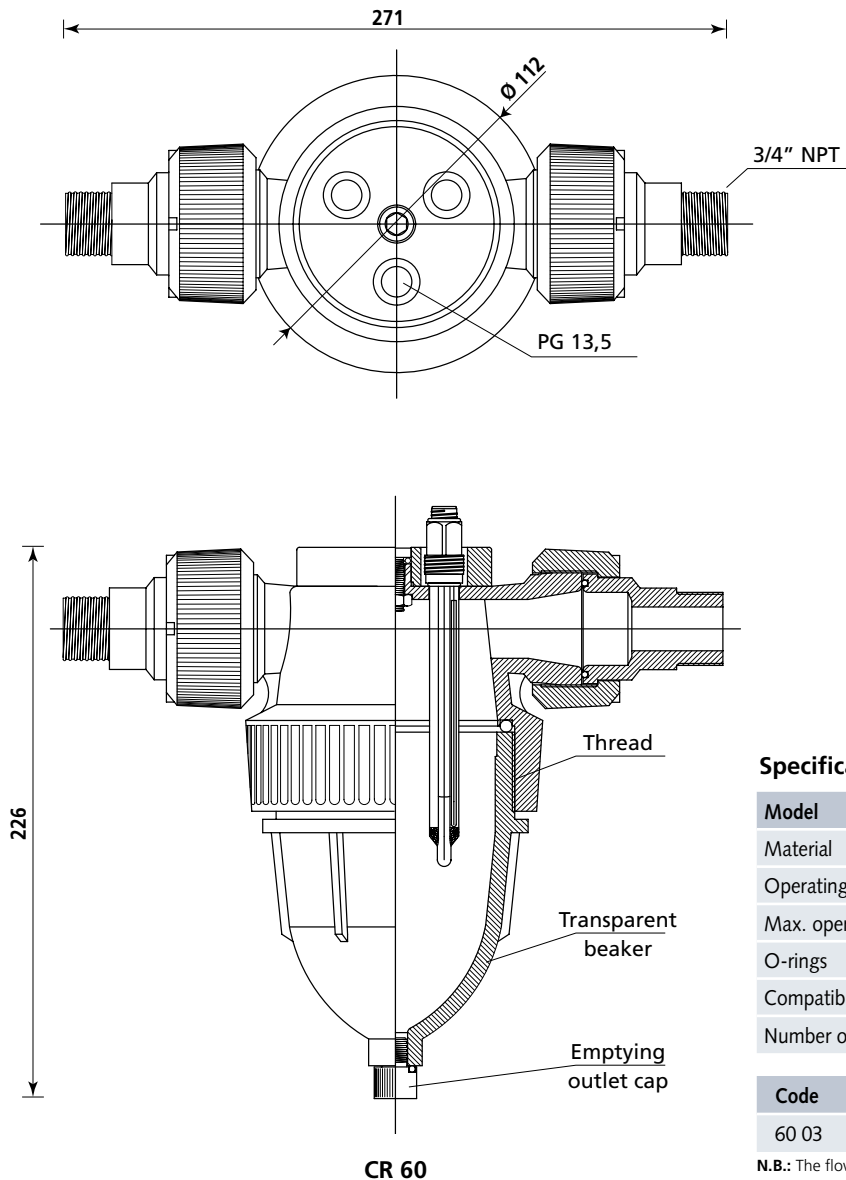
Sensors with PG 13.5 thread.

Installation

Installed by creating a by-pass, so as not to interfere with the normal flow of liquid. It also allows sensors to be replaced and maintained without interrupting the process. It is attached to pipes using 3/4" NPT weld-in sockets.

Important

When using a flow-through chamber to install less than three sensors, the other holes must be covered. (See PG 13.5 screw-cap, page 76)



Specifications

Model	CR 60
Material	PVC and Macrolon
Operating temperature	0...60 °C
Max. operating pressure	2 bar
O-rings	Nytrile
Compatible sensors	With PG 13.5 thread
Number of sensors	1, 2 or 3

Code	Description
60 03	CR 60 flow-through chamber, in PVC.

N.B.: The flow-through chamber is supplied without sensors

Cables, connectors and accessories

A collection of various cables, connectors, and accessories, including cables with different connectors, various types of connectors (plugs, sockets, adapters), and a metal mounting plate.

Cables...

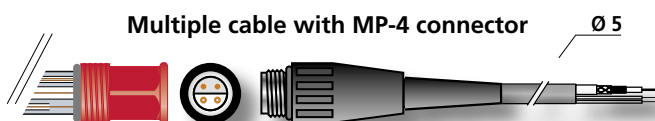
...for pH

Coaxial cable with AS9 connector



For pH and redox (ORP) electrodes.
Basically consisting of two conductors, one central and one external mesh. (see diagram)
The external PVC sheath protects it from humidity and corrosion. If perforated, either by cutting or abrasion, liquid may enter and cause short-circuits in the electrode connector, affecting the measurement and the electrode itself.
Supplied in different lengths with an integrated AS9 connector.
The watertightness factor of the AS9 connector is IP 65.
The coaxial cable supports temperatures of between -30 and 90°C.

Multiple cable with MP-4 connector



For pH electrodes with integrated ATC.
Made up of 1 coaxial cable and 2 conductors.
It has an integrated MP-4 connector, with an IP 67 protection degree.
The multiple cable supports temperatures of between -30 and 80°C.

... for conductivity or temperature

Multiple cable with MP-5 connector



For conductivity cells and temperature probes with MP-5 connector.
Comprises a screened, 8-conductor cable with an integrated, 5-contact MP-5 multipin connector.
The watertightness protection degree of the MP-5 connector is IP 67.
This cable supports temperatures of between -20 and 90°C.

... for D.O.

Multiple cable with VP connector



For D.O. electrodes with VP connector.
Made up of 1 coaxial cable, 5 conductors and general shielding. It has an integrated VP connector, with an IP 68 protection degree.
The VP cable supports temperatures of between -30 and 80°C.

Code	Description
	...for pH
10 03	Coaxial cable with AS9 connector, 3 m.
10 05	Coaxial cable with AS9 connector, 5 m.
10 10	Coaxial cable with AS9 connector, 10 m.
10 15	Coaxial cable with AS9 connector, 15 m.
10 20	Coaxial cable with AS9 connector, 20 m.
10 25	Coaxial cable with AS9 connector, 25 m.
	...for pH
93 00	Multiple cable with MP-4 connector, 3 m.
93 01	Multiple cable with MP-4 connector, 5 m.
93 02	Multiple cable with MP-4 connector, 10 m.
93 03	Multiple cable with MP-4 connector, 15 m.
	...for conductivity and temperature
90 44	Multiple cable with MP-5 connector, 3 m.
90 45	Multiple cable with MP-5 connector, 5 m.
90 46	Multiple cable with MP-5 connector, 10 m.
90 47	Multiple cable with MP-5 connector, 15 m.
92 51	Multiple cable with MP-5 connector, 20 m.
	...for D.O.
11 03	Multiple cable with VP connector, 3 m.
11 05	Multiple cable with VP connector, 5 m.
11 10	Multiple cable with VP connector, 10 m.
11 15	Multiple cable with VP connector, 15 m.

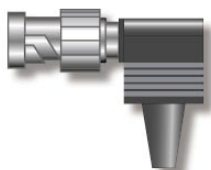
Connectors and accessories

91 06, straight BNC connector



Electrodes are connected to CRISON instruments PH 27, 28 and 29 with an easily-mounted BNC connector.

91 88, L-shaped BNC connector



For connecting an electrode with an integrated ATC to the PH 27, 28 and 29.

92 56, MP-4 connector



For coaxial cable. Used for pH electrodes with integrated ATC.

11 99, MP-5 connector



For connecting CRISON conductivity cells and temperature probes.

11 95 MP-5 connector, with electronic circuit



For connecting pH electrodes to the PH 25.

10 99, AS 9 connector



For coaxial cable Ø5 mm.

09 62, 962 connector



For coaxial cable extension, Ø5 mm.

61 90, cablepress, for coaxial cable

Ø 5, 2 units per pack

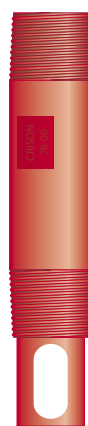
61 91, cablepress, for coaxial cable

Ø 7, 2 units per pack



76 10, sensor connection protector

Protector for sensor connection, in PVC, with 3/4" NPT thread.



76 00, electrode adaptor

Adaptor for mounting electrodes with PG 13.5 thread onto pipes. Made of PVC.

3/4" NPT

68 99, PG 13.5 screw-cap

PG 13.5 screw-cap, made of PVC, for "multisensor" immersion housings and flow-through chambers.



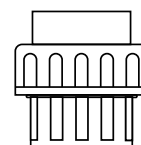
00 63, tube-to-tube joint



Used for installing In 63, In 68 and FL 69 housings with cleaning system. Part which joins the cleaning housings and the air or water tube. Internal diameter 6.

61 08, DN 50 3-piece adapter

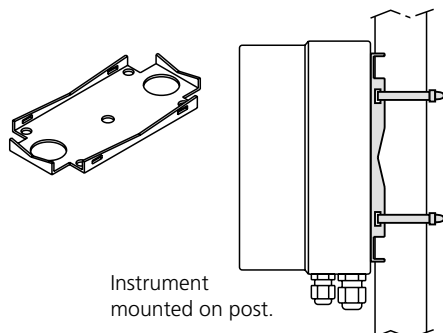
Made of PVC. For installing on In 61 immersion housings. This is a 3-piece adapter whose internal diameter has been modified, 50x43. (See page 68)



N.B.: The DN 63 and DN 75 are standard adapters which can be found in any specialised shop.

Connectors and accessories

91 20, post or pipe mounting adaptor



This is an accessory which, with the help of two cable ties, makes vertical or horizontal installation of the PH 28, PH 29, CM 38 and OXI 49 on a post or pipe easy.

91 03, set of 3 100-ml flasks.

For calibrating pH-meters



90 95, set of 3 100-ml flasks.

For calibrating conductivity meters



DN 25 weld-in sockets

For installing In 77 and In 78 insertion housings.
(See page 72)

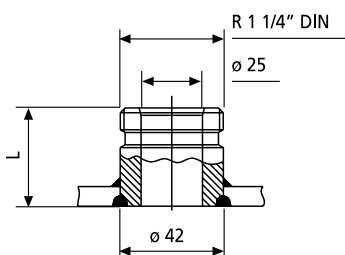
Straight

61 09, in PVC.

61 12, in PVDF.

61 14, in PP.

61 21, in stainless steel.



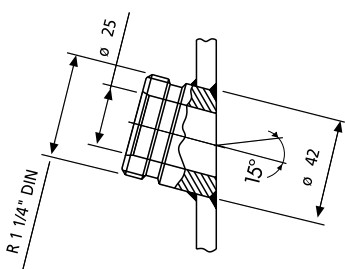
Inclined

61 09, in PVC.

61 13, in PVDF.

61 15, in PP.

61 22, in stainless steel.





Certificates of calibration and analysis

Certificates of calibration and analysis

CRISON Calibration Laboratory

CRISON has its own calibration laboratory for calibrating the standard solutions it produces and the equipment in its area of expertise that requires calibrating.

This is a separate department in CRISON's organisation. Its calibration procedures are DIN EN ISO 9001-certified.

All standards used by the CRISON Calibration Laboratory have been calibrated by organisations accredited by the European cooperation for Accreditation of Laboratories (EAL), such as ENAC, SIT, DKD, NIST, etc.

CRISON Instrument Calibration Certificate

Document issued by the CRISON Calibration Laboratory indicating the values obtained during calibration of the instrument as well as other parameters such as uncertainty, traceability, procedure, conditions, standards used, etc. During calibration, a comparison is made with standards calibrated by ENAC-accredited organisations.

It must be requested explicitly either when ordering a new instrument or afterwards, if the customer is already in possession of the latter. In the latter case, the instrument will need to be delivered to CRISON. The cost of calibration is paid by the customer in both cases.

CRISON Certificate of Analysis for standard solutions

Document in which the CRISON Calibration Laboratory indicates the values obtained during calibration of a standard solution, after analysing a portion of this solution.

NIST traceability, the analysis is conducted by contrasting with standard reference material (SRM) from the National Institute of Standards & Technology (NIST).

The certificate also indicates the following: batch number, composition, uncertainty, traceability, procedure, conditions, expiry date, etc.

The certificate is always supplied with each bottle, at no extra cost to the customer.

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CERTIFICADO DE CALIBRACION
Cat. n.º 89-20 pHmetro + sonda CAT

Certificado n.º: 945
Tipo de instrumento: CRISON INSTRUMENTS S.A. OLP 21 / 00001
Fabricante: CRISON INSTRUMENTS S.A.
Modelo y número de serie: INDUSTrias QUIMICAS S.A. (MADRID) AR-2726
N.º de pedido: 20-07-09
Fecha de calibración: 20-07-09

INFORME DE LA CALIBRACION.

Punto de test (temperatura/condensación)	Punto de test (temperatura/condensación)	Desviación	Incertidumbre
25.0	25.0	+0.01	±0.1
50.0	50.0	+0.01	±0.1
75.0	75.0	+0.01	±0.1
100.0	100.0	+0.01	±0.1
125.0	125.0	+0.01	±0.1
150.0	150.0	+0.01	±0.1

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CERTIFICADO DE CALIBRACION
Cat. n.º 89-30 Conductivimetro + C.A.T.

Certificado n.º: 970
Tipo de instrumento: Conductivimetro + sonda CAT
Fabricante: CRISON INSTRUMENTS S.A.
Modelo y número de serie: OLP 31 / 00001
N.º de pedido: INDUSTrias QUIMICAS S.A. (MADRID) AR-2726
Fecha de calibración: 20-07-09

INFORME DE LA CALIBRACION.

Punto de test	Desviación	Incertidumbre
25.0	+0.2	±0.2
50.0	+0.2	±0.2
75.0	+0.2	±0.2
100.0	+0.2	±0.2

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CERTIFICADO DE CALIBRACION
Cat. n.º 89-03 Termómetro + sonda

Certificado n.º: 972
Tipo de instrumento: Termómetro + sonda
Fabricante: CRISON INSTRUMENTS S.A.
Modelo y número de serie: 638 P1 / 2466
N.º de pedido: INDUSTrias QUIMICAS S.A. (MADRID) AR-2726
Fecha de calibración: 20-07-09

INFORME DE LA CALIBRACION.

Punto de test nominal °C	Leitura °C	Desviación °C	Incertidumbre °C
25.3	25.2	-0.1	±0.2
50.2	50.2	-	±0.2
75.1	75.2	+0.1	±0.2
100.0	100.2	+0.2	±0.2
125.0	125.2	+0.2	±0.2
150.2	150.4	+0.2	±0.2

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CERTIFICADO DE CALIBRACION
Cat. n.º 89-01 pHmetro

Certificado n.º: 973
Tipo de instrumento: pHmetro
Fabricante: CRISON INSTRUMENTS S.A.
Modelo y número de serie: 638 P1 / 2466
N.º de pedido: INDUSTrias QUIMICAS S.A. (MADRID) AR-2726
Fecha de calibración: 20-07-09

INFORME DE LA CALIBRACION.

Punto de test nominal °C	Leitura °C	Desviación °C	Incertidumbre °C
25.3	25.2	-0.1	±0.2
50.2	50.2	-	±0.2
75.1	75.2	+0.1	±0.2
100.0	100.2	+0.2	±0.2
125.0	125.2	+0.2	±0.2
150.2	150.4	+0.2	±0.2

CRISON certificates

What does CRISON calibrate?

Instruments: pH-meters, conductivity meters, thermometers, pH simulators, conductivity simulators and titrators.

Temperature probes: These are always calibrated while connected to the thermometer with which they are used.

In other words, we calibrate the thermometer and probe together.

They are not calibrated separately because, when connected to a thermometer, the readings obtained are distorted by possible errors in the instrument.

Solutions: pH buffers and conductivity standards, see pages 36 and 53.

Pre-calibration process

CRISON inspects the instrument to ensure that it is in perfect condition for calibration.

If the equipment needs fine-tuning or minor repair, this is carried out at no extra cost.

Faulty equipment

If the instrument needs repairing, the cost of the repair is invoiced separately.

What does CRISON not calibrate?

Instruments: Oxygen meters. As there is no traceable standard.

Sensors: ORP redox and pH electrodes, conductivity cells, O₂ electrodes. These sensors can not be certified due to a lack of stability over time and continuous alterations caused by use.

Solutions: redox standards, electrolytes, electrode regenerating solutions. These solutions can not be certified, either because there is no traceable standard or because they have no direct relationship with the measurement.

Other certificates...

EC Declaration of Conformity

This is included in the user manual of every instrument manufactured by CRISON.

Specifications certificate

Certificate issued after each instrument has been inspected in the final phase of the production process.

This certificate is supplied with every instrument and guarantees that the specifications of the user manual have been met.

This certificate indicates the traceability of standards used in the test.

Definitions

Calibration

Series of operations through which we can, under specific conditions, determine the relationship between known values of a magnitude to be measured and the values indicated by an instrument. Calibration does not involve tuning the instrument.

Tuning

Action carried out to an instrument to ensure that the values it indicates coincide with or are close to the standard values, within the tolerance range indicated by the manufacturer.

Code	Description
89 15	CRISON Calibration certificate for SI 75
89 16	CRISON Calibration certificate for SI 85
89 21	CRISON Calibration certificate for PH 27, PH 28, PH 29
89 31	CRISON Calibration certificate for CM 38 and CM 39

Index by code

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29 01	PH 29 field pH-meter, 24 V A/C.	10
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No. of employees: ☐ Less than 10 ☐ between 10 and 49 ☐ between 50 and 99 ☐
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NOTES

NOTES

A large grid of graph paper for taking notes. The grid consists of 20 columns and 30 rows of small squares, with a slightly larger margin at the top for the 'NOTES' header.